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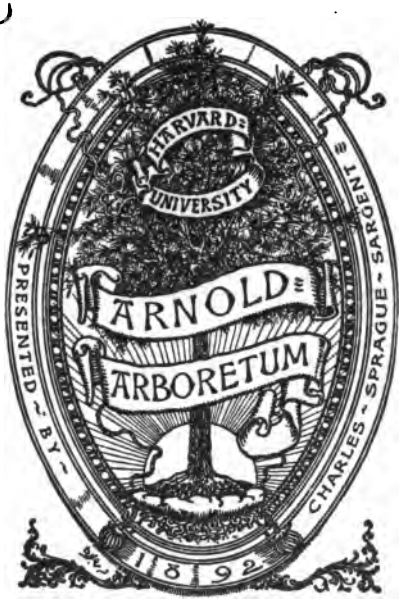
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1892

MUHLENBERGIA

An Illustrated Monthly Journal of Botany

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Volume 8

Reno, Nevada
1912

29298

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Volume 8 Numbers 1 and 2

MUHLENBERGIA

JANUARY-FEBRUARY, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Mimulus implexus Greene

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University of Nevada,
Reno, Nevada

Volume 8 February 29, 1912

MUHLENBERGIA

STUDIES IN THE GENUS ERYTHROCOMA Greene—I.

By C. P. Smith

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Introduction.—In June, 1909, I collected a plant of striking characters, new to me, on the hillsides above Cache Junction, Utah. The plant was in full fruit, and the prominent, plumose, persistent styles led me readily to determine it as *Geum ciliatum* Pursh, as treated in the meager literature then at hand. The flowers present seemed withered and belated, so caused me no concern, and no critical study of the material seemed necessary.

On May 1, 1911, while making a trip over the same hills, the plant was again secured, at this date being mostly in bud, but with sufficient material in full flower to make a satisfactory

collection. It was then noticed, with surprise, that the petals were really yellow, more or less red-veined and margined, not at all "purplish," as I had expected from the book descriptions. This observation led me into a more careful study of the plant, and later, upon examining critically my specimens of 1909, I was much surprised to find that the plumose styles were positively, tho inconspicuously, bent and jointed, much after the manner of *Geum* proper. As this character would seemingly disqualify my plant as a member of the genus *Sieversia*, of authors, I concluded that it was unknown to science, in fact, a worthy connecting link between the *Sieversia* species and typical *Geum*. A description was accordingly prepared and included in my notes for a paper then about ready for publication. Happily, however, I learned of Dr. Greene's recent paper (**12**) on *Sieversia* segregates in time to prevent the publication of my description and name; and so the matter has rested until the present time.

Recently, access was had to Greene's paper referred to above, and tho I felt sure that my plant must be accounted for in such an assemblage of described forms, I was unable to make a satisfactory determination. As Dr. Greene made no mention of variations as to the "unjointed" character of the style, and as I had observed decided variations in this respect amongst the plants in the *Geum ciliatum* and *G. triflorum* covers in the herbarium of Cornell University, my interest in the matter was again aroused, and opportunity was sought to investigate the real status of the variations observed.

Material examined.—Thru the kindness of Professors Whetzel and Rowlee of Cornell University, and of Dr. Rose and the authorities of the U. S. National Museum, there are now before me some 150 specimens of the genus *Erythrocoma* Greene, 130 specimens, including 20 type sheets, from the National Herbarium, and some 20 specimens from the herbarium of Cornell University. With this material before me, I am able to come to some conclusions which may be of interest to various students of systematic botany, especially as my conclusions are

based upon much of the material considered by Dr. Greene, excepting, particularly, that of his private herbarium.

Hypotheses adopted.—Geum ciliatum was made known to science by Pursh (**1**) in 1814. Subsequently, in the supplement at the end of the same work (**2**: 736), he described *G. triflorum*. Comparison of the original descriptions furnishes little to show that the two are different, or one and the same species; but nevertheless the descriptions are sufficient to make me feel, as presumably did Dr. Greene, that real representatives of Pursh's species are in this collection, tho his type specimens have not been seen.

For purposes of this study, therefore, it is assumed that these two species of Pursh, as well as all of Greene's segregates, are valid species, and I have accordingly followed the late classification of Greene (**12**) in laying out the material for study and in recording most of my observations. Each sheet of specimens was handled separately and with care, a good hand lens being used whenever styles were present. Tabulations were accordingly made, especially as to style characters and color of the petals, and such drawings made as seemed advisable.

Characters of the style.—The genus *Sieversia* was established by Willdenow about a hundred years since, and soon Pursh's *Geum ciliatum* and *G. triflorum* were transferred to it by European botanists. Altho *Sieversia* has not been allowed generic rank by American authors until recently, it was accepted by Gray, at least as early as 1856 (**5**), as a section of *Geum*, the section being there characterized, in part, as follows: "Styles not jointed, wholly persistent and straight;" and this is the treatment, to-day, in the latest edition of the Gray manuals (**15**). Also, in the Flore Canadienne (**7**) I find: "Styles non articules et persistant en entier. Sieversia R. Br.;" and in Britton and Brown (**10**): "Style . . strongly plumose throughout in fruit, not jointed." This, however, applied specifically to *G. ciliatum*.

But in 1899 Dr. Greene (**11**) reclaimed for *Sieversia* generic rank, and from him I now quote: "The essential characters of *Sieversia* as distinguished from *Geum* are those of its style; this

organ here being straight, continuous without articulation or bend, and in fruit wholly persistent and plumose; whereas in *Geum* it is short, stiff, jointed and bent at or near the middle, the upper portion eventually falling away."

Piper (**13**), Rydberg (**14**), and Nelson (**16**) have accepted *Sieversia* as a genus, and in their generic keys all use the main characters of the style emphasized by Greene, as quoted above.

Now let us see what may be shown by my study of the material at hand, beginning with *E. ciliata* and taking each form in turn.

E. ciliata: 79 specimens, 45 in fruit, of which 33 (73 and a third per cent.) are decidedly hooked, bent, or articulated, 6 not distinctly so (summing 86⅔ per cent. evidently so), 2 probably not so, 4 evidently not so, and 23 (50 per cent.) with pronounced evidence of the deciduousness of the portion beyond the joint or bend.

E. ciliata ornata: 3 specimens, none in fruit, hence can not be judged as to the style.

E. dissecta: 12 specimens, only 4 in fruit, 1 evidently jointed, 1 evidently unjointed, and 2 difficult of classification, but 1 of these with missing tips.

E flavula: 2 specimens, the types, both with fruit, 1 evidently jointed, the other questionably so, both with terminal portions deciduous.

E. australis: 1 specimen, the type, jointed and deciduous. (See *plate 1.*)

E. brevifolia: 5 specimens, 4 with fruit, 3 evidently jointed, 1 uncertain, the 4 deciduous.

E. campanulata: 1 specimen, the type, in flower only.

E. triflora: 20 specimens, 16 in fruit, all unjointed and wholly persistent, also in all of the next seven forms.

E. affinis: 2 specimens, type and co-type, both in fruit.

E. (*Hartman 700*): 1 specimen, in fruit.

E. arizonica: 7 specimens, 5 in fruit, including the type and a co-type.

E. tridentata: 3 specimens, all *Palmer 306* (type and co-types).

E. cinerascens: 6 specimens, 3 in fruit.

E. aliena: 1 specimen, the type.

E. grisea: 2 specimens, *Leiberg 5576* and *Barber 57*.

E. canescens: 2 specimens, *Brewer 2064*, *Heller 7159*, both unjointed, but Heller's plant with a few of the style tips broken off.

This ends the record as to the "unjointed and persistent" character of the style in the material before me, and it may easily be seen that there is but little in the way to permit an arrangement of the named forms into two groups, which, for present convenience, may be called the *Ciliatae* and *Triflorae* respectively.

Color of the petals.—Now let us give attention to this phase of the subject, first reviewing what literature leads us to expect. After the Latin description of *G. ciliatum*, Pursh (**1**) says: "flowers resembling those of No. 6." No. 6 is *G. rivale*, and of that he says "flowers yellowish-purple." According to various subsequent authors the "flowers" or "petals" are: "white," Nuttall (**2**); "yellowish-white, tinged with purple, persistent," Torrey(**4**); "purplish," Gray (**5**), Brewer and Watson (**8**); "richer purple than common," Cooper (**6**); "grandes, blanche veinees de pourpre," Provancher (**7**). Of these I especially note with pleasure the statements of Torrey and Provancher; but let me also call attention to the works of more recent authors, where we will find the color recorded as "light purple," Britton (**10**), Rydberg (**14**); "pale purple," Piper (**13**); "purplish," Robinson and Fernald (**15**), Coulter and Nelson (**16**).

Greene (**12**), however, says of his *E. campanulata*, "petals crimson tinted; of *E. dissecta*, "petals yellow," and of *E. flavula*, "calyx-segments purple-veined like the petals and yellowish," but of the remainder of his species the question of the color of the corolla is left for one to guess at or find out as best one may.

As stated in the introduction to the paper, the petals in the northern Utah plants collected by me were *pale yellow*, more or less margined and veined with *dull reddish*, a combination that I failed to interpret as "purplish." This coloration being well preserved in my specimens, I have used the same as the basis for comparison in making the tabulations, from which the following records are drawn:

Beginning with *E. ciliata*, 64 specimens are found with corollas that may be judged as to color. Of these, 6 may be called yellow with conspicuous red-purple apices, another 8 yellow with pronounced red (hardly purple) markings, and 50 must be put down as pale yellow with more or less reddish margining and veining of the petals. Those of *E. campanulata*, as described by Greene, are conspicuously "crimson-tinted," which agrees with what I have called "red-purple" above. Two of the 3 specimens of var. *ornata* have pronounced apical and marginal red-purple, as also 1 out of 6 specimens of *E. dissecta*, which may be passed upon. As to the other 5 specimens of *E. dissecta* and those of *brevifolia*, *australis*, and *flavula*, worthy of mention, the petals are simply pale yellow, as in most of the *ciliata* material at hand.

Of the 17 specimens of *E. triflora* with flowers present, 9 show prominent markings with red or red-purple, 4 are apparently almost unmarked pale yellow, and in 4 the petals are so withered and discolored as to discount any conclusion in their case. Of 6 flowering specimens of *E. cinerascens*, 3 may well be called "yellowish-purple," while in the other 3 the slight red pigment present might easily be neglected. Without making detail records as to the rest of the *Triflorae*, since so few specimens are at hand, I may simply say that in all specimens of *E. affinis*, *arizonica*, (*Hartman 700*), *grisea* and *aliena*, in which the color of the corolla may be judged, it is the same pale yellow with more or less inconspicuous reddening of the veins. The specimens of *E. canescens* and *E. tridentata* give us no certain information as to the corolla coloration; but I fully expect that it will prove to be the same with them as with the last four.

Key to the described forms.—One of the first things attempted upon getting access to the description of Greene's segregates, was to make a key for use in determining specimens, especially my own; but the result was so unsatisfactory that the attempt was soon abandoned. With the specimens before me, however, and tabulations made, the following key was constructed, items from Greene's descriptions being used as freely as possible.

1. Style hooked, bent, or articulated, the terminal portion often deciduous: leaflets commonly cleft, with narrow divisions (*Ciliatae*) 2
   Style neither hooked, bent, nor articulated, usually wholly persistent; leaflets mostly toothed to lobed, hardly cleft (*Triflorae*) 6
2. Basal leaves long and loosely clustered; leaflets mostly 20 mm. or more in length 3
   Basal leaves short and densely clustered; leaflets mostly 15 mm. or less in length 5
3. Calyx bractlets cleft into narrow divisions *E. ciliata ornata*
   Calyx bractlets entire, rarely toothed 4
4. Leaflets well separated, rarely touching *E. dissecta*
   Leaflets more crowded, more or less overlapping *E. ciliata*, *E. flavula*, *E. australis*
5. Bractlets shorter than the calyx lobes; petals conspicuously red-purple tipped *E. campanulata*
   Bractlets more conspicuous; petals mostly yellow *E. brevifolia*
6. Basal leaves long and loosely arranged; leaflets mostly over 20 mm. long 7
   Basal leaves short and condensed; leaflets mostly under 15 mm. long 11
7. Leaflets not deeply lobed; petals often red-purple tipped or margined 8
   Leaflets rather deeply lobed; petals yellow with little or no red 9
8. Leaflets broadly cuneate, the lateral lobes toothed and more spreading *E. triflora*
   Leaflets evidently narrow, the lateral lobes simple and nearly parallel *E. affinis*
9. Leaflets sparsely appressed pilose, not prominently ciliate-cuspidate 10
   Leaflets noticeably villous-pilose, minutely glandular dotted, the teeth prominently ciliate-cuspidate *E. tridentata*
10. Calyx bractlets, calyx lobes and petals nearly equal in length (*Hartman 700*)
    Calyx bractlets surpassing the nearly equal petals and calyx lobes *E. arizonica*
11. Leaflets broadly cuneate, lobed, the lobes toothed 12
    Leaflets more narrowly cuneate, toothed but not lobed 13
12. Leaflets with lobes and teeth very broad; densely soft villous-canescent; plumes about 30 mm. long *E. canescens*

Leaflets with lobes and teeth normal, appressed villous; plumes about 50 mm. long *E. cinerascens*

13. Foliage hoary, villous-tomentose; calyx lobes long-acuminate, surpassed by the linear bractlets *E. grisea*

Foliage pilose-ciliate; calyx lobes ovate-lanceolate, not surpassed by the bractlets. *E. aliena*

The key is, of course, but tentative, and intended especially for the use of field workers in the various localities where the little known forms occur. The illustrations, will, of course, be used in interpreting the key, average leaflets (from near the middle of the leaves) of most of the forms being represented. The expression "ciliate-cuspidate," used above, may be taken to mean a terminal tuft of fine hairs very much simulating a cusp.

Additional observations.—Leiberg 2555 (Oregon) and *Kronkhite 38* (Oregon), are mentioned by Greene (**12**) as perhaps referable to *E. canescens*. Their pubescence surely suggests that of *E. canescens*, as does also that of *Kennedy 1630* (Nevada) and of *Kellogg and Harford 209* (California); but all four have the cleft leaflets of *ciliata* proper, and three (Kennedy's plant being in flower only) have also the *ciliata* style.

The 39 fruiting specimens of *E. ciliata* that may safely be designated as jointed are from: California 1; Washington 4; Oregon 6; Idaho 6; Utah 1 (my own *1670*); Montana 4; Yellowstone Park 2; Wyoming 6; and Colorado 9. The other 6 specimens in fruit are: *Shear 4422* Beaver canyon, Idaho; *Mearns 2907* Yellowstone, and *Rydberg and Bessey 4414* Bridger mountains, Montana, which have the style evidently unjointed, but the terminal non-accrescent portion deciduous. *Griffiths and Hunter 80* Camas Prairie, Oregon, *E. W. Sheuber* Sunset, —? and *Rydberg 660* Custer, South Dakota, are evidently unjointed and persistent. *Rydberg 660*, however, should perhaps have been better classified as a transition form, and placed with the following.

As to *E. triflora*, the 16 fruiting specimens came from the following states: Illinois 5; Wisconsin 2; Minnesota 3; Iowa 2; South Dakota 3; and a specimen collected by Havard from the "Upper Missouri." The leaf characters of this Havard speci-

men, however, would warrant placing it with *E. affinis.* Strange that with so much material, none is at hand from east of Illinois. Newfoundland and Labrador specimens ought to be worthy of special study.

The sheet of *McCalla 2073* in the Cornell Herbarium includes two quite different things, the one on the left being a true co-type of *E. affinis*, the other a fair example of *E. ciliata.* Persons having specimens of this collection should note carefully the figures in *plate 3.* Also, collectors who may visit Banff, Alberta, may find field observations there to be especially interesting.

The specimen of *Hartman 700* from Chihuahua, Mexico, seems to represent the Mexican form of *E. triflora*, but it will probably prove to be indistinguishable from *E. arizonica.* It bears the same relation to *E. arizonica* that *E. aliena* does to *E. grisea* (see key). *Barber 57* from Williams, Arizona, is evidently *E. grisea*, tho apparently not determined by Dr. Greene.

Final discussion.—Dr. Greene, under *E. ciliata* (**12** 177) says: "Nothing is more easy than to distinguish these plants as a group, from the eastern *E. triflora.* To this I can readily agree, tho perhaps with a trifle less emphasis. To me this distinction can readily be extended to include all of the named forms, giving us the groups *Ciliatae* and *Triflorae*, as designated above. Now if these groups are indeed capable of separation on these or other characters, what about the long-accepted merging of the two original species of Pursh? And again, if these two groups, or species, or what one may choose to call them, be really separable on the characters presented in this paper, what about the continued inclusion of the *Ciliatae* in the genus *Sieversia* of Willdenow, or in the section *Sieversia* under *Geum*, as accepted by Gray? Surely a readjustment, or recharacterization of something should be done.

As claimed by Greene, these plants seem to be representative of a generic type sufficiently distinct from both typical *Geum* and *Sieversia*, and his genus *Erythrocoma* must therefore be accepted, if such a view is to be acknowledged. *Erythrocoma*, however, must be, in part at least, recharacterized, and careful analysis of the matter meets with important difficulties.

To quote further from Greene (12 174), in *Sieversia* the "mature styles are long, filiform, plumose to the very apex." And again (12 175), referring to "the type that has been called *Geum triflorum* and *Sieversia triflora*," "the accrescent and plumose character of the styles it has in common with *Sieversia*." Now the fact is that the style is accrescent *only* to the *elbow*, *hook*, or *articulation* (or where such would be if present), and only the accrescent part is *red* and *plumose*, the non-accrescent terminal portion being practically *glabrous* and light brown, *persistent* or *deciduous*. Only when the terminal portion is gone from the style, can that organ be said to be "plumose throughout." But such a statement must indeed be seriously questioned as having taxonomic value here. Others of the characters of *Erythrocoma*, however, are the erectness of the petals and calyx lobes, color of calyx and corolla, and, I may add, flowers nodding in anthesis; but all these characters are common to *Geum rivale*, which really seems to be closer, to my mind, to *Erythrocoma* than does *Acomastylis*. It seems to me, therefore, that *Erythrocoma* must be given due place as a section of *Geum*, *sensu latu*, and distinct from *Sieversia;* or *G. rivale* must be made the type of another genus, co-ordinate with *Sieversia*, *Acomastylis*, *Erythrocoma*, etc., in which case the real status of *Caryophyllata* Tourn. must be investigated.

Conclusions.—While certain questions that have arisen during this study must be left for further investigation, I feel that I am justified in coming to the following rather definite conclusions. *Geum ciliatum* Pursh, and *G. triflorum* Pursh, are worthy of recognition as separate species, neither name being synonymous with the other. Probably these two species are the only forms worthy of specific standing, the other named forms being better considered as varieties of one or the other. *Ornata*, *dissecta*, *campanulata*, and perhaps *brevifolia*, seem to be recognizable varieties of *E. ciliata*. I have failed to find characters sufficiently strong to really separate *flavula* and *australis* from the variations existing in the aggregate which I, as well as Dr. Greene (12 177), "fail to resolve into its specific elements by any certain characters."

Affinis, *tridentata*, *arizonica*, *cinerascens*, *grisea* and *canescens* I am prone to think may prove to be worthy local varieties of *E. triflora*, but *aliena* is, as I see it, too close to *grisea* to warrant recognition. Such variation exists in the relative lengths of the petals, calyx lobes, and calyx bractlets (even in different plants of the same collection), that I feel that very little dependence can be placed upon these in taxonomic questions.

Cornell University, Ithaca, N. Y.

PLATE 1

STYLE VARIATIONS

Unjointed

Figure 1. *E. canescens. Brewer 2064* (type), Ebbett's pass, California.

Figure 2. *E. triflora. Umbach*, 1897, West Chicago, Illinois.

Hooked

Figure 3. *E. australis. Baker 214* (type), Cimarron, Colorado.

Figure 4. *E. ciliata. Smith 1670*, Cache Junction, Utah.

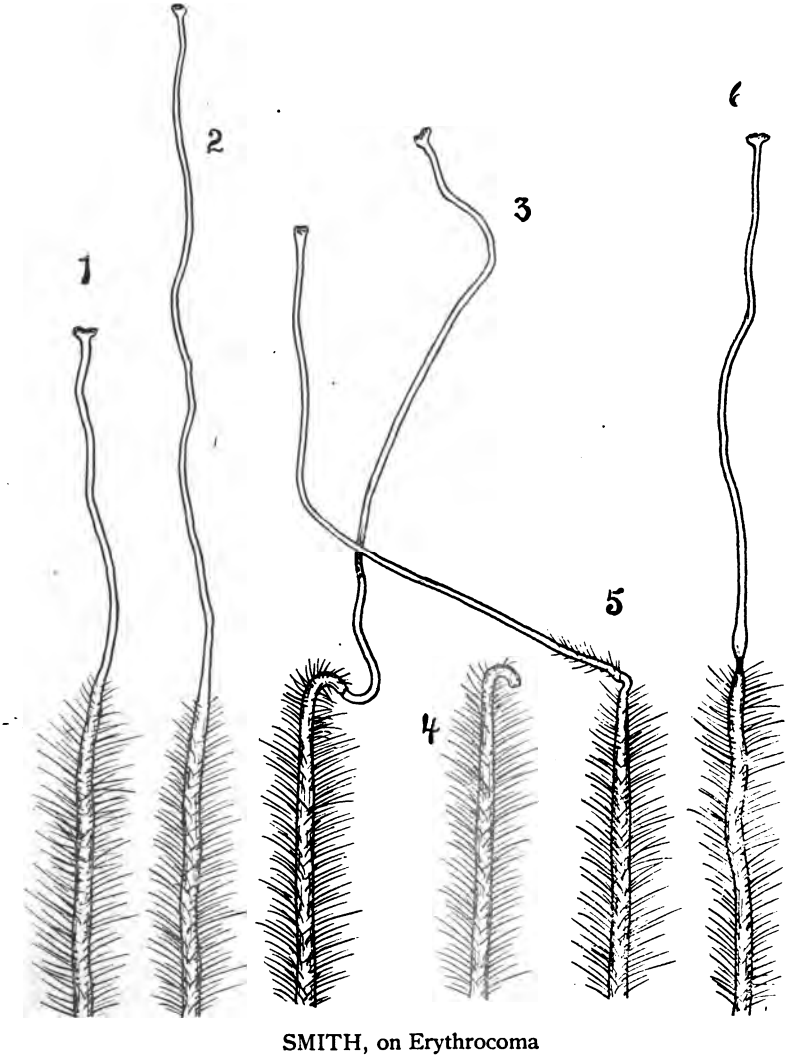
Elbowed

Figure 5. *E. ciliata. Smith 1670*, Cache Junction, Utah.

Articulated

Figure 6. *E. flavula. Nelson 829* (type), Union pass, Wyoming.

Plate 1



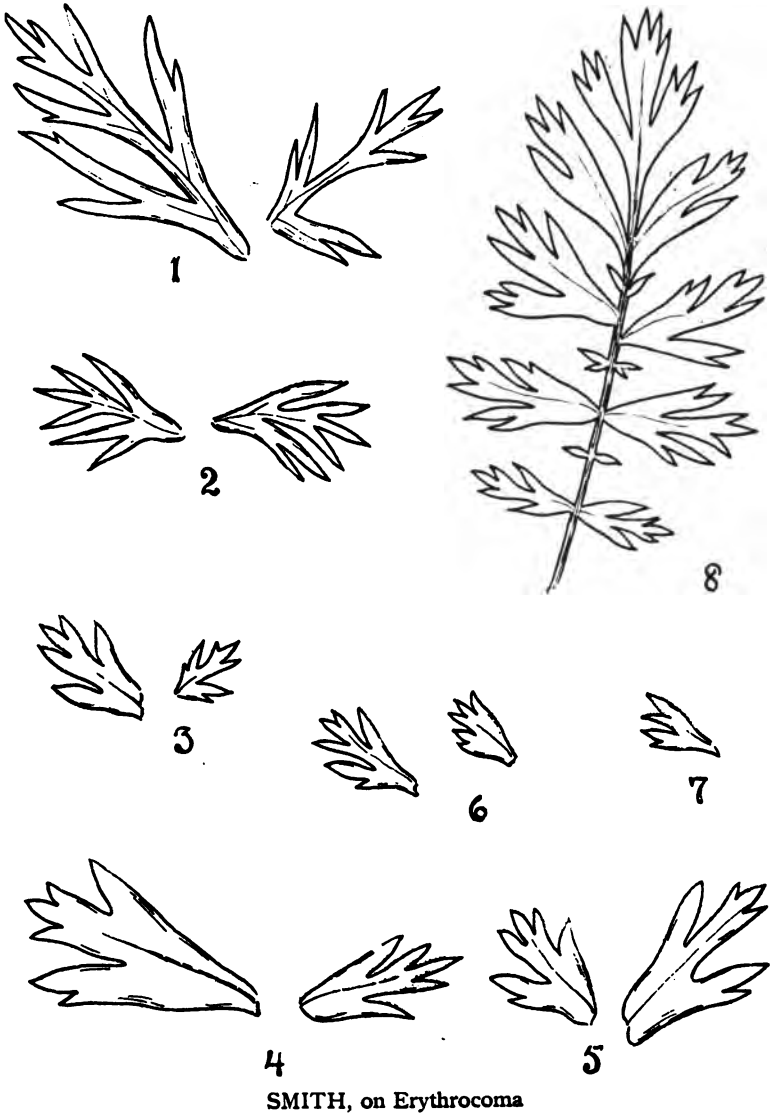
SMITH, on Erythrocoma

PLATE 2

CILIATAE

Figure 1. *E. ciliata.* *Piper 1532*, Pullman, Washington.
Figure 2. *E. ciliata.* *Cusick 2179*, Oregon.
Figure 3. *E. ciliata.* *Stevenson 104*, La Barge, Wyoming.
Figure 4. *E. ciliata?* *Griffiths and Hunter 80*, Camas Prairie, Oregon.
Figure 5. *E. australis.* *Baker 214* (type), Cimarron, Colorado.
Figure 6. *E. campanulata.* *Elmer 2529* (type), Olympic mountains, Washington.
Figure 7. *E. dissecta.* *Tweedy 223*, Cripple Creek, Colorado.
Figure 8. *E. dissecta.* *Baker, Earle and Tracy 372* (as in the Cornell Herbarium), Chicken creek, West Platte mountains, Colorado.

Plate 2



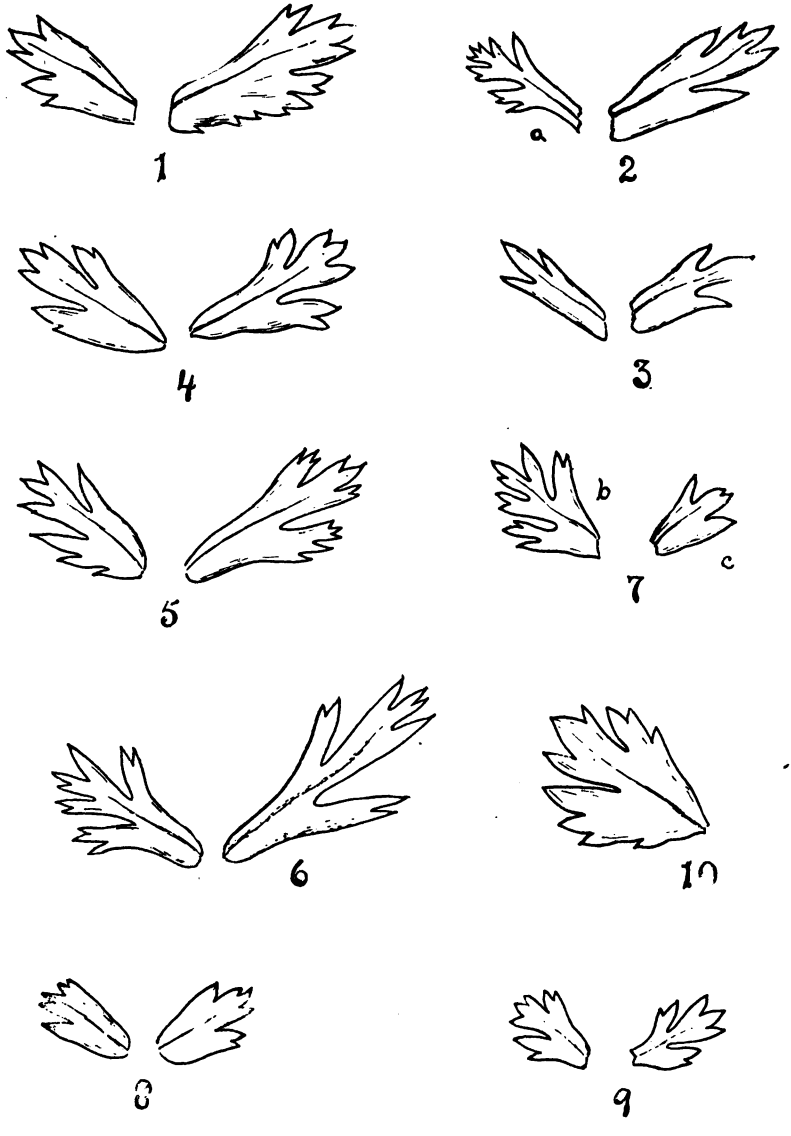
SMITH, on Erythrocoma

PLATE 3

TRIFLORAE

Figure 1. *E. triflora.* *Umbach*, 1897, West Chicago, Illinois.
Figure 2. *E. affinis.* *McCalla 2073* (type), Banff, Alberta.
Figure 2a. *E. ciliata.* *McCalla 2073 pars* (as in Cornell Herbarium).
Figure 3. *E. affinis?* *Havard*, "Upper Missouri."
Figure 4. *E.* ———. *Hartman 700*, Chihuahua, Mexico.
Figure 5. *E. arizonica.* *MacDougal 65* (type), Mormon lake, Arizona.
Figure 6. *E. tridentata.* *Palmer 506* (type), White mountains, Arizona.
Figure 7. *E. cinerascens.* *Forwood 106* (types), Fort Meade, South Dakota.
(b) Sheet *317360*, U. S. National Herbarium.
(c) Sheet *317373*, U. S. National Herbarium.
Pigure 8. *E. aliena.* *Townsend and Barber 15* (type), Sierra Madres, Chihuahua, Mexico.
Figure 9. *E. grisea.* *Leiberg 5578* (type), San Francisco Peaks, Arizona.
Figure 10. *E. canescens.* *Heller 7159*, Donner Pass, California.

Plate 3



SMITH, on Erythrocoma

ALPINE PLANTS—VI.

By P. Beveridge Kennedy

Alpine Monkey Flower, Mimulus implexus Greene

Several years ago a lady friend botanist when referring to the genus Mimulus, used the expression, "Oh, my beautiful Mimuli!" So when the writer came across the gorgeous golden mass produced by the plant which we use in our illustration and recognized it as a Mimulus, he realized very keenly the feeling that caused the above sentiment.

Figure 1. *Mimulus impiexus* Greene

The plants appear on a moraine of wet rocks over which a turbulent cold mountain stream had recently subsided. At first glance but little else could be seen besides the masses of large yellow flowers. On collecting the plants, one finds numerous fine fibrous roots and fleshy light brown rootstocks matted between the rocks, preventing the scanty soil from being washed away. From these, slender stems obout a span high arise. They are naked at base, but with several pairs of leaves above. The lowest ones are lanceolate-ovate, with an attenuated broad petiole. The upper ones, from which the flowers first make

their appearance, are broadly ovate and strictly sessile. All are more or less irregularly toothed and 3-nerved. From the broad ovate pair three flowering stems about 4 cm. long are produced, the two lateral ones ending in a solitary flower with naked pedicels, while the central stem continues on and sends off two more solitary flowers in like manner. The corolla is 25 mm. long, strongly bilabiate, with a densely bearded and purple dotted throat. The calyx is 10 mm. long, purple dotted, 5-toothed, four of equal length, and one extending 3 mm. beyond the others.

This plant was first described by Greene in Bull. Cal. Acad. **1**: 110. 1885, as *M. Tilingi* Regel. Ten years later, in Journal of Botany **33**: 8, he announces that Regel's plant is a member of the *Langsdorffii* group, and gave the name *M. implexus* to this plant. A year later he discovered that his *implexus* included two distinct species, and in Erythea **4**: 2, described *M. corallinus*. We found this latter species in our *implexus* cover, *Heller 7004*, collected July 23, 1903, three miles above Truckee, Nevada county, California. The character of the rootstocks of this species, well shown on the above mentioned specimen, are extremely interesting and characteristic.

Greene also calls attention to the character of the leaves of *M. implexus*, which he describes as "exceedingly thin membranaceous," and explains that this character belongs to *M. corallinus* and not to *implexus*.

Specimens were collected at the time the photograph was taken, and it is from these we get our notes. They are from Mt. Rose, Washoe county, Nevada, elevation 9650 feet August 17, 1905, *Kennedy 1190*. Heller also collected it in a more reduced form at the same place in September, 1909, no. *9969*. Another sheet placed here is from the East Humboldt or Ruby mountains, Elko county, August 11, 1908, elevation 10100 feet, *Heller 9386*.

This species may be looked for in herbaria in that great aggregate of forms and perhaps species under the guise of *M. Langsdorffii*. So far as we know, it is not in cultivation, but it would be difficult to find a plant more acceptable to lovers of alpines.

NEW COMBINATIONS—VII.

By A. A. Heller

Alsinopsis arctica (Stev.)
Arenaria arctica Stev. in DC. Prodr. **1**: 404. 1824.

Alsinopsis californica (Gray)
Arenaria brevifolia var. (?) *californica* Gray, Proc. Cal. Acad **3**: 101. 1864.
Arenaria californica Brewer, in Bolander, Cat. 6. 1870.

Alsinopsis Douglasii (Fenzl)
Arenaria Douglasii Fenzl; T. & G. Fl. N. A. **1**: 674. 1840.

Anisolotus grandiflorus (Benth.)
Hosackia grandiflora Benth. Trans. Linn. Soc. **17**: 366. 1836.
Lotus grandiflorus Greene, Pittonia **2**: 145. 1890.

Anisolotus rigidus (Benth.)
Hosackia rigida Benth. Pl. Hartw. 305. 1849.
Lotus rigidus Greene, Pittonia **2**: 142. 1890.

Anisolotus strigosus (Nutt.)
Hosackia strigosa Nutt.; T. & G. Fl. N. A. **1**: 326. 1838.
Lotus strigosus Greene, Pittonia **2**: 141. 1890.

Miltitzia glandulifera (Torr.)
Emmenanthe glandulifera Torr. in Wats. Bot. King Rep. 157. 1871.

THE FLORA OF THE RUBY MOUNTAINS—IV

By A. A. Heller

Apparently only one of the canyons of the South Fork has received a name—Rattlesnake canyon, the southernmost one. On August 11th we started up what may be called the middle canyon, the way leading for several miles along a stream coming from the adjoining canyon on the north, then changing to a broad, low ridge, which was crossed at about 7000 feet, when we entered the proper canyon. Here, a short distance above the stream, on the sage brush covered slope, but in fairly moist soil, one of the first plants noticed was an unknown Apocynum. It was compared with material in the great eastern herbaria last summer, and nothing like it was seen.

Apocynum cinereum n. sp.

Stems several from a thick woody rootstock, 6 dm. high, purplish, finely cinereous, as are also the other parts of the plant, simple below, branched from a little below the middle, the branches somewhat cymose but not symmetrical: leaves ovate-lanceolate, apiculate, the larger ones 6 cm. long, 3.5 cm. wide, dull green above, pale beneath, midvein yellowish, prominent; petioles short, about 3 mm.: cymes short, 3 to 4 cm. long and about as broad: pedicels 2 mm. long, the lanceolate, scarious bractlets at their base about half as long: calyx 2 to 2.5 mm. long, the lobes oblong-lanceolate, acute, 1.5 to 2 mm. long, barely 1 mm. wide at base: corolla pinkish, 5 mm. long, the erect lobes lanceolate, 2 mm. long, 1.5 mm. wide at base: stamens 3 mm. long, the yellow lanceolate-acuminate anthers fully 2 mm. long, the saggitate-acute basal lobes extending .5 mm on either side of the stout, .5 mm. wide filament: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9383*, collected August 11, 1908, in the middle canyon of the South Fork of the Humboldt, above Lee post office, Elko county, Nevada, altitude 7200 feet.

This, in some respects peculiar species, is referable to the cannabinum group on account of its small and narrow flowers, but the leaves and comparatively small size of the plant, with

Plate 4

Apocynum cinereum Heller

spreading branches, would associate it with the androsaemifolium group. It is probably nearest related to the glabrous *A. oliganthum* Greene, of western Nevada, which has synonyms in *A. viarum* Heller, Muhlenbergia **2**: 110. 1906, and *A. bicolor* McGregor, Bull. Torr. Club **37**: 261. 1910, the latter from the type region of *A. oliganthum*.

Just below the Apocynum station, in low ground near the stream, in an aspen grove, *Calochortus nitidus* was plentiful. This is one of our handsomest species, the perianth segments white with a purple spot at the middle. They stand well apart from each other, and are peculiar in being very persistent. This species is not recorded by Watson.

For the greater part of the way the trail led along the stream, crossing and recrossing it, winding through aspen thickets and other undergrowth, much of it enlivened by clumps of brilliantly colored flowers.

At 8700 feet a halt in a meadow on the banks of the ice cold stream, yielded the type of *Carex fissuricola* Mackenzie, while near at hand were *Allium validum*, *Bistorta linearifolia* and *Parnassia intermedia*, all originally collected in this range. The latter is the *Parnassia fimbriata* of Watson.

At 9300 feet before climbing up a cross ridge, or rather a bench which stretches across the canyon, and through which the stream cuts at one side, an open place covered with coarse granite sand yielded *Spraguea nuda* and *Polygonum Austinae?* the former at least far removed from its hitherto known range in the Sierra Nevada.

Between 9550 and 9600 feet are found three small lakes, and about them a rich profusion of plants. Several of the most interesting are *Silene acaulis*, carpeting dripping rocks, and with it the diminutive *Salix saximontana; Pneumonanthe calycosa* on the raised wet borders of the lakes, in company with *Micranthes arguta* and *Caltha rotundifolia*. Here the latter was in fruit, while only a hundred feet higher in the open meadow along the stream were numerous plants with newly opened flowers.

A dry slope on the south side, above the meadow, produced several Erigerons, Senecios and Arnicas, growing among scattered pine trees at 9700 feet, while in a damp place, still on the slope at 9900 feet were found *Oreobroma pygmaea* and *Lithophragma bulbifera.* The latter is another of the few species common to both eastern and western Nevada, being abundant locally in the mountains west of Reno.

A surprise awaited me at 10100 feet at the head of the canyon, for here, among the stones in the shallow stream bed was *Mimulus implexus*, just as it occurs with us on Mt. Rose and at other places in the Sierra Nevada.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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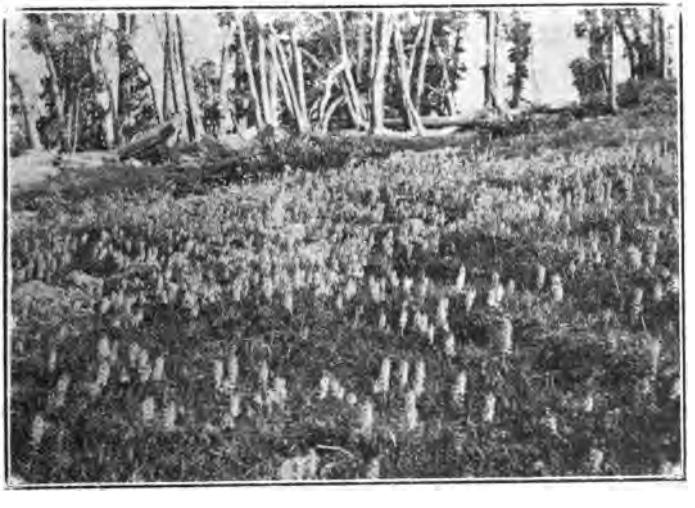
Volume 8 Number 3

MUHLENBERGIA

MARCH, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY



Elephantella attolens (Gray) Heller

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University of Nevada,
Reno, Nevada

Volume 8 March 30, 1912

MUHLENBERGIA

ALPINE PLANTS—VII.

By P. Beveridge Kennedy

Little Elephant's Head (*Elephantella attolens* (Gray) Heller

Gray first described this species in 1867 from plants collected in the swamps of the high Sierra Nevada mountains by Brewer, Torrey, Bolander, and Bridges, giving it the name *Pedicularis attolens*. Rydberg, in his Flora of Montana, recognized the striking difference in the appearance of the flowers of these plants when compared with the louseworts or true Pedicularis. He proposed the very appropriate name *Elephantella*, "in allusion to the form of the corolla, which strikingly resembles the

Figure 2. *Elephantella attolens* (Gray) Heller

head of an elephant, the produced beak of the galea forming the trunk, the lateral lobes of the lip the ears, and the stigma the

finger-like appendage of the trunk." These characters are even more pronounced in the larger and more common relative, the large elephant's head, *Elephantella groenlandica.*

The photograph was taken on Mt. Rose, Washoe county, Nevada, at an elevation of about 10000 feet. The trees in the background are the alpine white pine, *Pinus albicaulis.*

THE MONARDELLAS OF SOUTHERN CALIFORNIA—I

By L. R. Abrams

The genus *Monardella* is peculiar to western North America, ranging from eastern Washington southeastward through the Great Basin region to Colorado, and southward along the Pacific slope to Lower California and Cedros Island. It reaches its greatest development in the Transition and Upper Sonoran zones of central and southern California. There are probably thirty or more species, but the group is an extremely plastic one, which makes the definition of specific lines difficult.

Flowers in rather loose heads: calyx 12 to 28 mm. long: corolla tube well exserted, much longer than the corolla lobes: pollen sacs strongly divaricate, ovate-oblong: perennials. I. Macranthae.

Flowers in dense heads: calyx 10 mm. or (usually 8 mm.) less in length: corolla tube scarcely exserted, but little longer than the corolla lobes: pollen sacs not strongly divaricate, short rounded-oblong: annuals or perennials. II. Pycnanthae.

I. Macranthae

Corolla tube narrowly funnel form: calyx 3 to 4 mm. wide: filaments stoutish; anthers 1.25 mm. long

Anthers well exserted: corolla scarlet

Herbage sparsely pubescent or puberulent 1. M. macrantha

Herbage more or less densely villous 1a. M. macrantha Hallii

Anthers scarcely equaling, or the longer slightly exceeding the corolla lobes: corolla yellowish, the tube very slender funnelform 1b. M. macrantha longiloba

Corolla tube narrowly cylindrical, scarcely over 1 mm. wide or less: calyx 2mm. wide: filaments decidedly filiform; anthers 0.7 mm. long.

Herbage sparsely villous or pubescent with spreading hairs: flowers yellowish, tinged with rose; corolla tube 1 mm. or slightly more in width.

Corolla tube about 15 mm. long, its lobes 6 to 7 mm. long: herbage pubescent 2. M. nana

Corolla tube about 20 mm. long, its lobes 7 to 10 mm. long: herbage villous 2a. M. nana leptosiphon

Herbage cinereous with a short appressed pubescence: flowers pale yellow or white; corolla tube less than 1 mm. wide.

Corolla tube about 20 mm. long, its lobes about 6 mm. 2b. M. nana tenuiflora

Corolla tube 15 to 18 mm. long, its lobes usually less than 5 mm. 2c. M. nana arida

II. PYCNANTHAE

Perennials

Leaves not undulate or crisped on the margin

Leaves similar on both surfaces

Herbage cinereous with short, dense, villous-like tomentum; leaves ovate-triangular, irregularly denticulate 3. M. cinerea

Herbage glaucous green, or silvery with a minute puberulence, not at all tomentose

Stems villous, with spreading multicellular hairs: leaves villous pubescent 4. M. australis

Stems short pubescent or puberulent, with recurved hairs

Leaves bright glaucous green: stems short pubescent, with slender 2-celled hairs

Bracts purple, broadly to narrowly ovate, acute: stamens glabrous to their bases, these and the corolla throat very sparsely villous: low tufted plants 5. M. epilobioides

Bracts lanceolate, herbaceous or nearly so: stamens villous below the middle: corolla throat copiously villous below the insertion of each stamen 5a. M. epilobioides erecta

Leaves canescent or silvery: stems puberulent with recurved subulate or triangular, 1-celled hairs

Upper surface of leaves with upwardly appressed or curved hairs

Herbage glaucous green with rather sparse, evident puberulence: oil ducts on lower surface of leaves crowded 6. M. viminea

Herbage silvery, clothed with dense very fine puberulence scarcely perceptible under a strong lens: oil ducts on under surface of leaves scattered 7. M. linoides

Upper surface of leaves with retrorsely appressed or curved hairs: herbage silvery canescent with very dense and evident puberulence 8. M. oblonga

Leaves densely hoary tomentose beneath, glabrous or villous above

Leaves ovate to ovate-oblong, glabrous and dark green above; lateral veins impressed on the upper surface. 9. M. hypoleuca

Leaves appearing linear from strongly revolute margins, villous above; lateral veins obscure with no impressions above 10. M. lanata

Leaves undulate on margin, somewhat succulent; stems woolly tomentose 11. M. crispa

Annuals

Leaves undulate on margin: bracts and calyx villous: stems pubescent 12. M. undulata

Leaves not undulate
Bracts obtuse or acute
Bracts 10 mm. or more in length: calyx 7 mm. long, teeth triangular-subulate, usually with bristle-like hairs at the sinuses 13. M. lanceolata
Bracts 6 mm. or less in length: calyx 6 mm. long, teeth triangular, without bristle-like hairs 13a. M. lanceolata microcephala
Bracts abruptly acuminate: calyx teeth triangular-subulate
Bracts villous pubescent: calyx teeth villous pubescent, not hyaline tipped 14. M. Pringlei
Bracts short pubescent or puberulent
Calyx teeth short pubescent, not hyaline tipped, these and bracts tinged with rose 15. M. Elmeri
Calyx teeth villous, their margins and tips hyaline, these and bracts with white or rarely rose tinged margins 16. M. exilis

1. MONARDELLA MACRANTHA A. Gray, Proc. Am. Acad. **11**: 100. 1876.

Madronella macrantha Greene, Leaflets **1**: 169. 1906.

Stems slender, lignescent at base, branching from a slender creeping rootstock, 2 to 5 dm. high, pubescent or puberulent with more or less recurved hairs; internodes 2 to 5 cm. long: leaves ovate to elliptical, 1 to 2 cm. long, on petioles about half their length, entire or rarely faintly serrate, nearly or quite glabrous: bracts equaling or shorter than calyx, thin, more or less membranaceous and colored, ciliate on margins with long villous hairs: flowers 10 to 20 in head: calyx usually over 2 cm. long, villous at base, glandular pubescent throughout, teeth 4 mm. long, subulate: corolla 3 to 4 cm. long, slender funnelform, scarlet or tinged with yellow, minutely and sparsely pubescent without: stamens exserted beyond corolla lobes; anthers on rather stout filaments 1.25 mm. long between tips of diverging pollen-sacs.

Thirty-one herbarium sheets of this species are before me, and throughout all of them, except those referred to the variety *longiloba*, the funnelform corolla tube and exserted stamens hold well as characters. The size of the anther is also a well marked distinguishing feature between this and the *nana* group. In pubescence there seems to be a complete gradation from merely puberulent stem and glabrous leaves to the densely villous pubescent variety.

Type locality: "Southern part of California, on the Cuiamaca Mountains, and near Julian City, D. Cleveland, E. Palmer." Palmer's specimens, according to his field notes, were collected "among pines" on the Cuiamaca mountains.

Distribution: San Pedro Martir mountain, Lower California, Cuiamaca, Palomar and San Bernardino mountains of southern California, and reappearing again in the Santa Lucia mountains of Monterey county. Coniferous forests and upper altitudes of the chaparral belt of the coastal slope.

Specimens examined: Monterey county: Santa Lucia mountains, *Vasey 487*, Tassajara Hot Springs, *Elmer 3228*, Big Sur, *Davy 7436;* Palomar (Smith) mountain, *Orcutt 433*, *Brandegee*, August 1, 1898, *Susan G. Stokes*, July 5, 1896, *Chandler 5370;* Julian, *Dunn*, June 5, 1875; between Julian and Cuiamaca, *Abrams 3812;* Cuiamaca mountains, *Palmer 295*, *Brandegee*, July 6, 1894, *Susan G. Stokes*, July, 1895; Laguna mountains, *Orcutt*, July, 1899; San Pedro Martir mountains, *Brandegee*, May 16, 1893.

1a. MONARDELLA MACRANTHA **Hallii** var. nov.

Herbage densely villous pubescent throughout: calyx long villous and glandular pubescent throughout, otherwise like typical *macrantha.*

Type: Polomar mountain, *Hall 1936*, May, 1901.

Distribution: Palomar and San Bernardino mountains in coniferous forests and chaparral.

Specimens examined: Mill Creek canyon, San Bernardino mountains, *Parish*, May, 1898, and *4578;* Palomar mountain, *Brandegee*, August 1, 1898; *Hall 1936; Chandler 5370; McClatchie*, July 5, 1896; *Susan G. Stokes*, July 5, 1896.

1b. MONARDELLA MACRANTHA **longiloba** var. nov.

Monardella macrantha tenuiflora Hall, Univ. Cal. Pub. Bot. **1**: 110. *pl. 11.* 1902. Not *M. tenuiflora* S. Wats.

Stems villous pubescent, internodes 3 to 5 cm. long: leaves ovate, 15 to 25 mm. long, on petioles of about equal length, pubescent on both surfaces, lateral veins evident: calyx 20 mm. long, villous throughout and glandular pubescent, lobes subu-

late, 4 mm. long: corolla yellowish, tube 25 mm. long, very slender funnelform, 3 to 3.5 mm. broad at summit, short villous pubescent throughout, lobes 10 mm. long, equaling or slightly exceeding the stamens: filaments pubescent; anthers 1.25 mm. long.

These plants were referred by Hall to *tenuiflora*, but true *tenuiflora* is the montane form of *nana*, which Hall described as variety *pinetorum*.

Type: Chaparral belt of south side, canyon of San Jacinto river, at 4300 feet altitude, San Jacinto mountains, *Hall 976*, July 4, 1898. This specimen is the one figured by Hall, and is sheet *25485* in the University of California herbarium.

Distribution: Coastal slopes of the San Jacinto mountains, in the chaparral belt.

Specimens examined: Chaparral belt, San Jacinto river, San Jacinto mountains, altitude 4000 to 4400 feet, *Hall 669, 687, 976*.

2. MONARDELLA NANA A. Gray, Proc. Am. Acad. **11**: 101. 1876.

Monardella macrantha nana Gray, Syn. Fl. ed. 2, **2**: part 1, 459. 1886.

Madronella nana Greene, Leaflets **1**: 169. 1906.

Stems branching from a slender lignescent rootstock, 15 to 30 cm. long, internodes 15 to 30 mm. long, retrorsely pubescent: leaves ovate, 15 to 20 mm. long, green and very sparingly pubescent above, lateral veins evident on the lower surface: bracts narrowly ovate, 15 to 20 mm. long, membranaceous, pale, tinged with purple: calyx 12 to 15 mm. long, 2 mm. broad, villous and glandular pubescent, teeth subulate, 3 mm. long: corolla rose color or yellowish, tube cylindrical, 1.5 mm. broad, 15 to 18mm. long, conspicuously pubescent without, lobes 5 to 6 mm. long, equaled by the longer pair of stamens: filaments very slender; anthers 0.7 mm. long.

In its typical form, this species has shorter and stouter corolla tubes than the extreme varieties, but the intergradation in pubescence and flowers seems complete.

Type locality: "S. California, in the Mountains behind San Diego, D. Cleveland." Collected near Talley's, according to specimens in the Brandegee herbarium.

Distribution: Typical *nana* seems restricted to the Cuiamaca mountains in the coniferous forest and upper chaparral belt.

Specimens examined: Julian valley, 1880 *Brandegee*, June 13, 1894 (approaching the variety *leptosiphon*); Cuiamaca mountains, *Hall 1202;* "San Felipe," *Parry;* Laguna mountains, *Orcutt*, July, 1889 (approaching variety *arida*); between Oriflamme canyon and Cuiamaca, *Abrams 3941;* Campbell's ranch, Laguna mountains, *Mearns 3642*.

2a. MONARDELLA NANA **leptosiphon** (Torr.) comb. nov.
Monardella villosa leptosiphon Torr. Bot. Mex. Bound. 129. 1859.

Closely resembling typical *nana* in habit, foliage and pubescence: calyx villous throughout: corolla tube sparsely pubescent, 20 to 25 mm. long, 1 mm. wide: corolla lobes 1 cm. long, exceeding the stamens: filaments very slender; anthers 0.7 mm. long.

Considered by Hall as intermediate between his variety *pinetorum* and the plant he figured as variety *tenuiflora* (*macrantha longiloba* of this paper). In general aspect this is true, but the slender cylindrical corolla tube, the filiform filaments and small anthers, clearly assign this to the *nana* group. The variety *longiloba*, on the other hand, retains the funnelform corolla tube, although narrower than that of true *macrantha*, and the stouter filaments and large anthers, characters that amply justify maintaining *macrantha* and *nana* as different specific groups.

The plants from "the central part of the State" referred to this variety by A. Gray (Syn. Fl. **2**: part 1, 357) are totally different, and belong to the villosa group.

Type locality: "San Felipe," probably in the mountains west of San Felipe canyon along the old San Diego-Fort Yuma road.

Distribution: Palomar mountain in chaparral and open forests.

Specimens examined: Palomar (Smith) mountain, *Orcutt 2110*, *Susan G. Stokes*, July, 1895, *McClatchie*, July 3, 1896, *Brandegee*, August 1, 1898; "San Felipe," *Parry*.

2b. MONARDELLA NANA **tenuiflora** (S. Wats.) comb. nov.

Monardella tenuiflora S. Wats.; A. Gray, Proc. Am. Acad. **17**: 230. 1882.

Monardella macrantha tenuiflora A. Gray, Syn. Fl. ed. 2, **2**: part 1, 459. 1886.

Monardella macrantha pinetorum Hall, Univ. Cal. Pub. Bot. **1**: 110. *pl. 12*. 1902.

Stems 1 dm. long or less, cinereous with close recurved pubescence: leaves ovate to elliptic, 15 mm. or less in length, finely pubescent above, lateral veins very obscure on lower surface: calyx villous throughout: corolla pale yellow, tube less than 1 mm. long: stamens included, or longer pair sometimes exserted.

This variety was well defined and figured by Hall as his variety *pinetorum*, but unfortunately he applied Watson's *tenuiflora* to a plant quite distinct from the original. Watson's species was based upon S. B. and W. F. Parish's *327*, which is cited by Hall under his variety *pinetorum*. Three sheets of this number and fragments of the type, kindly sent by Dr. Fernald from the Gray Herbarium, are before me, as well as several collections of Hall's, including duplicates (no. *2127*) of his type, and there can be no question that these specimens are all one and the same thing.

Type locality: "S. California, at San Jacinto, in San Diego, July, 1880, S. B. & W. F. Parish." The type is *S. B. & W. F. Parish 327*, which, according to the printed labels, was collected on San Jacinto mountain, and not "at San Jacinto."

Distribution: Apparently confined to San Jacinto mountains, where, according to Hall, it occurs in the yellow pine belt at 6000 to 8000 feet altitude.

Specimens examined: San Jacinto mountains, *S. B. & W. F. Parish 327* (type); *Anthony*, July 2, 1895; *Hall 691*, *2258*, *2559*; *Reed 2491*.

2c. MONARDELLA NANA **arida** (Hall) comb. nov.

Monardella macrantha arida Hall, Univ. Cal. Pub. Bot. **1**: 111. *pl. 10.* 1902.

Herbage cinereous throughout with short close pubescence, stems short, usually less than 1 dm. long: leaves crowded, usually less than 1 cm. long, rather thick, lateral veins not evident: bracts white, tinged with rose, equaling or exceeding the calyx: calyx villous throughout: corolla white or cream yellow, tube scarcely over 0.5 mm. wide, 15 to 20 mm. long, lobes mostly less than 5 mm. long.

Type locality: "In the desert region to the southeast of San Jacinto Mt., along Coyote Creek, at 5000 ft. alt."

Distribution: Desert slopes of the San Jacinto and Santa Rosa mountains.

Specimens examined: Eastern base of San Jacinto mountain along the borders of the Colorado desert, between Van Deventer's and Palm canyon, altitude 4000 feet, *Hall 1852*; Coyote canyon, Santa Rosa mountain, altitude 5000 feet, *Hall 1180*, *2127* (type).

3. **Monardella cinerea** sp. nov.

Stem slightly woody at base, freely branching, branches spreading, 1 dm. or less in length, cinereous: leaves sessile, 5 to 8 mm. long, broadly ovate-triangular, obtuse at apex, abruptly rounded at base, denticulate, cinereous on both surfaces with soft villous tomentum, lateral veins in 2 pairs: floral pair of leaves similar, closely subtending heads: bracts broadly ovate, acute or obtuse, 8 mm. long, purple, faintly veined, sparsely villous pubescent: heads 15 to 20 mm. broad, many flowered: calyx 7 mm. long, purple tinged, tube villous pubescent and glandular, teeth subulate, 2 mm. long, villous within: corolla tube not exserted, lobes 4 mm. long: lower stamens slightly exceeding lobes, a third longer than upper pair.

In general aspect suggesting some form of *nana*, but belonging according to floral characters to the *Pycnanthae* section, and most closely related to the next, from which it is readily distinguished by the character of the pubescence.

Type: Mount San Antonio, at about 9000 feet altitude, *Abrams 1928*, July 24, 1901. The type specimen is in the Dudley Herbarium.

Distribution: Known only from near the summit of Mt. San Antonio.

Specimens examined: Near the summit of Mt. San Antonio, *Abrams 1928; Mrs. H. E. Wilder*, August 1, 1905.

4. **Monardella australis** sp. nov.

Perennial from a woody rootstock, branches decumbent, 1 to 1.5 dm. long, villous and pubescent: lower leaves reduced, entire or remotely denticulate; cauline of 4 to 5 pairs, oblong-lanceolate, mostly 15 mm. long, 6 mm. broad, thin, pale and somewhat grayish-green with villous pubescence; lateral veins evident, in 3 pairs: bracts ovate or broadly acuminate, 12 to 15 mm. long, membranaceous, light green tinged with pink, sparsely villous and glandular: calyx 8 mm. long, sparsely pubescent, its teeth subulate, 1.5 mm. long: corolla tube equaling or slightly exceeding calyx, pubescent, lobes about 5 mm. long: lower stamens a third longer than lower corolla lobes.

This is probably the most southern representative of the *odoratissima* group. It is readily distinguished from true *odoratissima*, which was described from plants collected by Douglas "in petrosis ad flumen Columbia et in rupibus alpestribus in montibus White Montibus," by the acuminate instead of rounded bracts, as well as by foliage and habit. The last two collections cited below approach *epilobioides*, and eventually a large series may form a complete intergradation between these two, and through the variety of *epilobioides* connect up, by an unbroken chain, the *odoratissima* and *linoides* groups.

Type: Tamarack valley, altitude 9200 feet, San Jacinto mountains, *Hall 2486*, July, 1901. The type specimen is deposited in the Dudley Herbarium.

Distribution: Open coniferous forests of the San Jacinto and San Bernardino mountains from 6000 to 10000 feet altitude.

Specimens examined: San Jacinto mountains, *Hall 713, 2486;* San Bernardino mountains, *S. B. & W. F. Parish 462;* Bear valley, altitude 6000 feet, *Hall*, July, 1899; Deer creek; *Abrams 2046.*

5. MONARDELLA EPILOBIOIDES Green, Pittonia **5**: 85. 1902.

Monardella linoides stricta Parish, Erythea **7**: 96. 1899.

Madronella epilobioides Greene, Leaflets **1**: 169. 1906.

Perennial from a woody rootstock, 1 to 2 dm. high: branches erect or decumbent, light green, with short retrorsely spreading pubescence of slender, 2-celled hairs. Leaves oblong-linear, obtuse, entire, firm, only the midvein evident, bright glaucous green, appearing glabrous, but minutely and sparsely pubescent under a lens: heads 12 to 15 mm. broad: bracts ovate-lanceolate, 10 mm. or less in length, acute or short acuminate, membranaceous, rose-purple: calyx 6 mm. long, nearly glabrous except villous inner surface of teeth: corolla tube well exserted, 8 mm. long: stamens very unequal, filaments glabrous except at base.

The type specimen of *epilobioides* was distributed by Mr. Parish with the following label: "*Monardella linoides*, var. *stricta* Parish (ined.), Bear Valley, San Bernardino Mountains, altitude 6500 feet, *S. B. Parish*, June, 1894." This specimen is a very good match for the type of Parish's variety, which was collected at the same place ten years before.

Type locality: "Bear Valley, at the eastern base of the San Bernardino Mountains, California." Bear valley is not "at the base of the mountains," but at an altitude of 6700 feet.

Distribution: Coniferous forests of the Canadian and Transition zones of the San Bernardino mountains.

Specimens examined: Bear valley, San Bernardino mountains, *Parish 2077*, and June, 1894, *Shaw* & *Illingworth 203;* Bluff lake, San Bernardino mountains, *Pettibone*, August, 1895; Hathaway Flat, San Bernardino mountains, altitude 6000 feet, *Abrams* & *McGregor 805;* Santa Ana canyon, San Bernardino

mountains, altitude 6100 feet, *Grinnell*, July 27, 1906; same, altitude 8500 feet, *Hall 7578*.

5a. MONARDELLA EPILOBIOIDES **erecta** var. nov.

Resembling the typical form in foliage and pubescence: stems taller: bracts green or only faintly tinged with purple: corolla throat copiously villous within below insertion of each stamen: filaments villous below middle.

Strikingly different from the species in extreme forms, but intergradations are abundant. The more robust specimens certainly suggest a close relationship to the *linoides* group. This is especially true of the specimens from the San Antonio mountains.

Type: On dry ridges, Bear valley, San Bernardino mountains, altitude 6700 feet, *Abrams 2861*, August 3, 1902. The type specimen is in the Dudley Herbarium.

Distribution: Open coniferous forests of the San Bernardino and San Antonio mountains.

Specimens examined: San Antonio mountains, altitude 7000 feet, *Hall*, July, 1896; San Antonio mountains, Swartout canyon, altitude 6700 feet, *Hall 297;* Green valley, San Bernardino mountains, *Shaw* & *Illingworth 202;* Bear valley, San Bernardino mountains, *Abrams 2861*.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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539 West 5th street, Reno, Nevada

Volume 8 Number 4

MUHLENBERGIA

APRIL, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Hulsea algida Gray

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University of Nevada,
Reno, Nevada

Volume 8 April 25, 1912

MUHLENBERGIA

THE MONARDELLAS OF SOUTHERN CALIFORNIA—II

By L. R. Abrams

6. Monardella viminea Greene, Pittonia **5**: 85. 1902.

Madronella viminea Greene, Leaflets **1**: 169. 1906.

Stems woody at base, about 6 dm. high, glaucous green, finely puberulent: leaves narrowly linear-lanceolate, 2 to 4 cm. long, glaucous green, clothed with fine comparatively sparse puberulence, this upwardly appressed on upper surface, oil ducts thickly crowded on lower surface: bracts ovate-lanceolate, greenish, tinged with rose-purple: calyx pubescent, villous on the triangular-subulate teeth.

Type locality: "From some unrecorded locality in the mountains of San Diego Co., California."

Distribution: Foothills on the coastal slope of San Diego county.

Specimens examined: San Diego county, locality not given, *Vasey 491* (type); Poway, *Susan G. Stokes*, August, 1895; McCoon's ranch, near Poway, *Parish 4421;* San Diego, *Brandegee*, May 21, 1894.

7. Monardella linoides A. Gray, Proc. Am. Acad. **11**: 101. 1876.

Madronella linoides Greene, Leaflets **1**: 169. 1906.

Perennial from a woody base, 3 to 5 dm. high: branches silvery with very fine, almost imperceptible, retrorsely appressed puberulence: leaves 15 to 20 mm. long, linear or linear-oblong, entire, thick, veins not evident, silvery with very minute puberulence composed of triangular 1-celled hairs, those on upper surface upwardly appressed or curved: bracts broadly ovate, or acut-

ish, about 1 cm. long, membranaceous, pale: calyx 8 mm. long, puberulent, villous on the short, triangular-subulate teeth.

Type locality: "S. California, in the mountains east of San Diego, Dr. Palmer." This is number 261 of Palmer's 1875 collections, and according to his field notes was collected at "Oriflamme Mine," which is situated in Oriflamme canyon on the desert slopes of the Cuiamaca mountains about five miles east of Cuiamaca lake.

Distribution: Western borders of the Colorado desert in the juniper and pinyon belt, or rarely extending into the yellow pine belt.

Specimens examined: Big Morongo canyon, altitude 3000 feet, *Parish 3009;* Tauquitz valley, San Jacinto mountains, altitude 7000 feet, *Hall 2430;* twenty miles south of Palm Springs, *Hall 758;* Coyote canyon, Santa Ana mountains, *Hall 2137;* Oriflamme canyon, *Palmer 261*, *Abrams 3932;* Laguna mountains, *Orcutt*, July, 1889.

8. MONARDELLA OBLONGA Greene, Pittonia **5**: 83. 1902.

Madronella oblonga Greene, Leaflets **1**: 169. 1906.

Stems woody at base, 2 to 4 dm. high: herbage silvery canescent throughout with dense appressed puberulence: leaves oblong, 15 to 20 mm. long, rounded at the slightly tapering apex, upper surface with retrorsely appressed, subulate, 1-celled hairs: bracts broadly ovate, acute or shortly acuminate, membranaceous, pale or tinged with rose-purple, 9 to 12 mm. long: calyx 9 mm. long, pubescent and glandular, lobes and sinuses with stiff spreading hairs: corolla apparently pale rose-purple.

I have not seen the type of *oblonga*, but from the description and distribution there seems little doubt that the plants here described belong to that species.

Type locality: "In the mountains south of Tehachapi, California."

Distribntion: In the pinyon and lower altitudes of the yellow pine belts of the mountains bordering on the Mojave desert, from Mt. Pinos to the Panamint mountains, and on the western slope of the Sierra Nevada in Kern county.

Specimens examined: North Fork, Mt. Pinos, altitude 6000 feet, *Hall 6461;* north slope of Mt. Pinos, *Hall 6405;* Mt. Pinos, *Grinnell 16;* Mt. Frazier, *Elmer 3952;* Argus Peak on rocky slopes, *Purpus 5089;* Wild Rose canyon, Panamint mountains, *Coville & Funston 2045.*

9. MONARDELLA HYPOLEUCA A. Gray, Syn. Fl. **2**: pt. 1, 356. 1878.

Monardella robusta Elmer, Bot. Gaz. **39**: 46. 1905.

Madronella hypoleuca Greene, Leaflets **1**: 116. 1906.

Stems tufted, woody at base, 3 to 5 dm. high, more or less tomentose: leaves ovate-oblong, 2 to 4 cm. long, obtuse, entire, slightly revolute, densely white tomentose beneath, glabrous and shiny above, veins evident, impressed on upper surface: bracts broadly ovate, obtuse, 1 cm. long, tomentose, calyx villous, its teeth triangular-subulate: coralla pale.

Type locality: "S. E. California, San Bernardino Co."

Distribution: Coastal mountains of southern California from Santa Barbara to Orange county.

Specimens examined: Rattlesnake canyon near Santa Barbara, *Elmer 3728;* Mountain Drive, Santa Barbara, *Abrams 4149;* Topango canyon, Santa Monica mountains, *Hasse*, January, 1906; San Juan Hot Springs, *Nevin*, 1882.

10. **Monardella lanata** sp. nov.

Stems tufted, woody at base, 2 to 4 dm. high, villous pubescent: leaves narrowly oblanceolate, appearing linear on account of the strongly revolute margins, 15 to 30 mm. long, sessile or short petioled, with shorter ones fascicled in their axils, soft villous above, hoary beneath with a dense tomentum, thick, lateral veins not at all evident: heads about 2 cm. broad: bracts ovate-lanceolate, herbaceous, villous, equaling the calyx: calyx 8 mm. long, 10-nerved, villous throughout, teeth triangular-subulate, 1.5 mm. long: corolla white, tube 10 mm. long, pubescent, lobes 4 mm. long: filaments sparsely pubescent.

Related to *hypoleuca*, from which it is distinguished by the much narrower and thicker leaves, the absence of lateral im-

pressed veins, and the villous pubescence on the upper surface of the leaves.

Type: Descanso grade, near the top, Cuiamaca mountains, San Diego county, *Brandegee*, July 19, 1906. The type is sheet no. *104626* of the University of California herbarium.

Distribution: Western slopes of the southern part of the Cuiamaca mountains southward, probably extending into Lower California.

Specimens examined: Descanso grade, *Brandegee*, July 19, 1906; Potrero mountains, *Orcutt 996*.

11. MONARDELLA CRISPA Elmer, Bot. Gaz. **39**: 46. 1905.

Stems woody below, much branched, 3 dm. high, young branches villous pubescent: leaves oblanceolate, 2 to 5 cm. long, rounded at apex, tapering to the slender petiole, sparsely pubescent, somewhat succulent, undulate on the margin: bracts broadly ovate, rounded or the inner acute, membranaceous between the 7 or 8 parallel veins: calyx 6 mm. long, villous, its triangular teeth rather blunt at the apex: corolla purple, tube not exserted: stamens well exserted.

This species is a very near relative of *undulata*, being distinguished chiefly by its stouter perennial habit, and pubescence.

Type locality: "Surf, Santa Barbara County, California," where it is "confined to the drifting sand beaches."

Distribution: Known only from the vicinity of Surf, Santa Barbara county.

Specimens examined: Surf, *Elmer 3965*.

12. MONARDELLA UNDULATA Benth. Lab. Gen. et Sp. 332. 1834.
Madronella undulata Greene, Leaflets **1**: 169. 1906.

Stems erect, usually much branched, 2 to 3 dm. high, puberulent: leaves oblanceolate, 3 cm. long or less, thickish, dark green, sparsely puberulent, margins strongly undulate: bracts broadly ovate, 10 mm. long or less, acute or mucronate, veins and margin green, otherwise thin and scarious, villous pubescent: calyx villous pubescent, its teeth triangular: corolla deep purple.

Type locality: "In California septentrionali." First collected by Douglas, presumably near Monterey.

Distribution: A coastal species of central California, extending from Point Reyes to the northwestern part of Santa Barbara county, probably not occurring within our limits, that is, south of Point Conception.

Specimens examined: Santa Barbara county, no locality given, *M. S. Baker*, July, 1895.

13. MONARDELLA LANCEOLATA A. Gray, Proc. Am. Acad. **11**: 102. 1876.

Monardella sanguinea Greene, Pittonia **5**: 86. 1902.

Madronella lanceolata Greene, Leaflets **1**: 169. 1906.

Madronella sanguinea Greene, Leaflets **1**: 169. 1906.

Stems more or less puberulent, usually simple below, 1 to 5 dm. high: leaves lanceolate-oblong, 25 to 40 mm. long, tapering into a slender petiole, green and glabrous or minutely puberulent: bracts ovate to ovate-lanceolate, acute, herbaceous or more or less tinged with purple, lateral veins usually prominent, sparsely and minutely scabrous, especially on veins: calyx teeth triangular-subulate, villous within, sparsely pubescent without and more or less hispid with spreading hairs at sinuses: corolla rose-purple.

This handsome and very fragrant species has a wide range and exhibits considerable variation. An extreme form was recognized by Gray as variety *microcephala*, which seems to possess characters worthy of specific distinction, but the examination of a large series of specimens (35 sheets) from southern California, clearly shows a complete intergradation. I have not seen the type of Greene's *sanguinea*, which was collected "near Julian" by G. W. Dunn "in 1881 and 1888," but there is a specimen of Dunn's answering Greene's description, before me which was collected at Julian in 1892. This seems to be one of the intermediate stages between true *lanceolata* and the variety *microcephala*.

Type locality: Only the general range, "California, from Plumas to San Diego Co.," was given in the original publication, and no collections were cited.

Distribution: Upper Sonoran and Transition zones of the Sierra Nevada from Butte county southward. In southern California it is found through the Transition and Upper Sonoran zones of the mountains and on the foothills and sandy plains as far south as Riverside and Orange counties. Along the southern border of its range, especially in the San Jacinto and Cuiamaca mountains, intergradation between the typical form and the variety becomes evident.

13a. MONARDELLA LANCEOLATA MICROCEPHALA A. Gray, Syn. Fl. ed. 2, **2**: pt. 1, 459. 1886.

Monardella peninsularis Greene, Pittonia **5**: 87. 1902.

Madronella peninsularis Greene, Leaflets **1**: 169. 1906.

Inflorescence strongly divaricate, branched: leaves scabrous above: heads 10 to 12 mm. broad: bracts ovate, about 6 mm. long: calyx sparsely pubescent with ascending hairs, teeth triangular-subulate, without hispid hairs at base: corolla lobes 5 to 6 mm. long.

Type locality: "Potrero, near San Diego."

Distribution: In the valleys and foothills of San Diego county, extending southward into adjacent Lower California.

Specimens examined: Tigh's ranch, San Diego county, *Palmer 294;* Potrero, *Susan G. Stokes*, July, 1895; Pine valley, *Orcutt*, July, 1899; *Mearns 3983;* Cameron's ranch, Laguna, *Mearns 3692;* near San Diego, *Palmer 257;* Hansen's ranch, Lower California, *Orcutt 929.*

14. MONARDELLA PRINGLEI A. Gray, Proc. Am. Acad. **19**: 96. 1883.

Madronella Pringlei Greene, Leaflets **1**: 169. 1906.

Stems erect, branching near base, puberulent: leaves lanceolate, 35 mm. long or less, puberulent, narrowed to a short petiole: bracts broadly ovate, abruptly accminate, 8 to 10 mm. long, villous pubescent: calyx teeth narrowly triangular-subulate, villous pubescent without: corolla rose-purple.

Type locality: "Sandy ridges, near Colton, San Bernardino Co., S. E. California, Pringle."

Distribution: Apparently one of the most local species, found only in the vicinity of Colton, in the San Bernardino valley.

Specimens examined: Sandy ridges near Colton, *Pringle*, May 23, 1882; *Parish 6396*.

15. **Monardella Elmeri** sp. nov.

Stems erect, branching from the base, puberulent: leaves lanceolate to narrowly ovate, 25 mm. long or less, narrowed to a short petiole, somewhat cinereous with a fine puberulence: bracts broadly ovate, abruptly acuminate, 12 mm. long, sparsely scabrous, green below, becoming membranous above and tinged with rose-purple, midvein dividing near base into about 8 parallel lateral veins: calyx 7 mm. long, sparsely short pubescent with spreading hairs, 15-nerved, teeth narrowly triangular-subulate, 2 mm. long, sparsely short pubescent without, villous within, herbaceous throughout or tinged wiih rose-purple: corolla rose-purple, slightly exceeding calyx, sparsely short pubescent, lobes 4 mm. long.

This species is intermediate in habit between *Pringlei* and *exilis*. From the former it is best distinguished by the character of the pubescence on the bracts and calyx, and from the latter by the herbaceous instead of hyaline tipped calyx teeth.

Type locality: Acton, Los Angeles county, *Elmer 3681*, June, 1902. The type specimen is in the Dudley Herbarium.

Distribution: Known only from the type locality.

16. MONARDELLA EXILIS (A. Gray) Greene, Pittonia **5**: 86. 1902.
Monardella candicans exilis A. Gray, Syn. Fl. **2**: pt. 1, 358. 1878.
Madronella exilis Greene, Leaflets **1**: 169. 1906.

Stems erect, simple or branching below, 2 to 3 dm. high, sparsely puberulent: leaves broadly to narrowly lanceolate, 3cm. long or less, puberulent: bracts broadly ovate, abruptly acuminate, 10 cm. long or less, veins all about equally prominent, greenish, margins white-scarious: calyx teeth narrowly triangular-subulate, white-scarious on margin and tip, villous pubescent without.

Type locality: "S. E. California or adjacent Arizona." This was collected by Palmer (*364*) in 1876 on the Mojave river, according to the type specimen in the Gray Herbarium.

Distribution: Upper end of the San Joaquin valley and in the western part of the Mojave desert.

Specimens examined: Mojave river, *Palmer 364* (type); dry sands, Mojave desert, *Pringle*, May 17, 1882; Lancaster, *Dudley & Lamb 4302;* Palmdale, *Elmer 3648;* Burcham's ranch, Mojave river, *Parish 4909;* near Mojave station, *Hall 7382;* sandy places in Walker's Pass, *Purpus 5347*.

In the preparation of this paper I am greatly indebted to Dr. J. N. Rose for the loan of all the southern California specimens in the National Herbarium; to Dr. H. M. Hall for those in the herbarium of the University of California; to Mr. S. B. Parish and Dr. A. Davidson, for material in their private herbaria, and to Dr. M. L. Fernald and Dr. P. A. Rydberg for notes on type specimens in the Gray Herbarium and the Torrey Herbarium respectively.

Stanford University, California.

NEW PLANTS FROM COLORADO

By George E. Osterhout

Cogswellia concinna sp. nov.

Perennial from a long fleshy root: a cluster of leaves and usually several peduncles borne at the summit of a short stem, this having some leaves at its base: leaves sheathing at base, 1 dm. or more long, about half the length being the petiole, pinnate with three or four pairs of oblong leaflets more or less divided, or some of the lower leaves bipinnate: peduncles much exceeding the leaves, the longer ones 2 dm. long, dividing into a 5 to 10-rayed umbel, the rays 2 to 4 cm. long: involucre a rather indistinct scarious sheath, sometimes bearing linear bracts: involucel a single foliaceous bractlet divided into several oblong parts: flowers numerous, yellow: carpels oval, 7 to 8mm.

long by 6 mm. wide, lateral wings broad, the dorsal ribs usually one and two, filiform; oil tubes numerous and small, 8 to 15 on the commissure, 5 to 10 in the intervals.

Collected at Paeonia, Delta county, Colorado, May 21, 1911, no. *4515*. It was quite plentiful on the hills on the south side of the railroad, and at the time collected was in good fruit, tho still flowering.

GNAPHALIUM DECURRENS **glandulosum** var. nov.

Stem 3 to 4 dm. high, glandular pubescent below, becoming woolly near the top and on the branches: leaves green on both surfaces and shortly glandular pubescent, decurrent on the stem: corymbosely branched at the top and bearing numerous heads, these woolly at base, the white involucral bracts somewhat acuminate and becoming rusty tinged in age, as is the pappus.

Differs from *Gnaphalium decurrens* Ives, by having less tomentum on the stem, and the leaves green on both surfaces.

The type specimen was collected in Estes Park, Larimer county, Colorado, August, 1895, no. *547;* collected also at Sulphur Springs, Grand county, Colorado, August 8, 1907, no. *3584*.

NEW COMBINATION

Nuttallia multicaulis

Touteria multicaulis Osterhout, Bull. Torr. Club **30**: 236. 1903.

Windsor, Colorado.

ALPINE PLANTS—VIII.

By P. Beveridge Kennedy

Alpine Dandelion

Hulsea algida Gray, Proc. Am. Acad. **6**: 548. 1865.

Hulsea caespitosa Nelson and Kennedy, Proc. Biol. Soc. Wash. **19**: 38. 1906.

One is amazed when first encountering this large yellow flowered plant seemingly growing in an impossible situation among masses of loose volcanic rocks. Closer investigation shows, however, that its long stout dandelion-like root extends for a considerable distance down into good soil. The leaves are well protected when young with a cottony wool and later by a dense clothing of glandular hairs.

Figure 3. *Hulsea algida* Gray

The original description is somewhat confusing in the statement that the heads are "an inch in diameter." When fully expanded, including the rays, they are two inches wide.

The terms stems, peduncles and leafy stems are also misleading as applied to the different species. The plant is composed of several tufts of radical leaves from the center of which

emerges a leafy bracted peduncle terminating in a single head. There are about six foliaceous bracts on each peduncle, the lowest three inches long, and the uppermost close to the head half an inch long. Differing in these points from the then available descriptions of *H. algida*, Professor Nelson and myself were led to believe our plant to be a new species, and named it *Hulsea caespitosa*.

The species was first collected by Brewer on Mt. Dana at 11500 feet, and by Bolander and Muir on the higher summits of the Sierra Nevada mountains. Rothrock is reported to have collected it on Mt. Whitney at 13700 feet.

The collection from which our photograph was taken was from the summit of Mt. Rose, Washoe county, Nevada, *Kennedy*, August 17, 1905. Other collections from the same place are by *Brown* and *Heller*. These are the only collections from Nevada that we know of at the present time.

NEW COMBINATIONS—VIII.

By A. A. Heller

Draba ammophila

Draba Helleri Small, Fl. Southeast. U. S. 479. 1903; not *Draba Helleriana* Greene, Pittonia **4**: 17. 1899.

Dipetalia ruderalis (Nutt.)

Ellimia ruderalis Nutt.; T. and G. Fl. N. A. **1**: 125. 1838.
Oligomeris ruderalis Nelson and Kennedy, Muhlenbergia **3**: 138. 1908.

Anisolotus argyraeus (Greene)

Hosackia argyraea Greene, Bull. Cal. Acad. **1**: 184. 1885.
Lotus argyraeus Greene, Pittonia **2**: 144. 1890.

Anisolotus grandiflorus (Benth.)

Hosackia grandiflora Benth. Trans. Linn. Soc. **17**: 366. 1836.
Lotus grandiflorus Greene, Pittonia **2**: 145. 1890.

Anisolotus leucophaeus (Greene)

Lotus leucophaeus Greene, Pittonia **2**: 145. 1890.

Hosackia grandiflora var.? *anthyloides* Gray, Proc. Phila. Acad. **1863**: 350. 1863.

Anisolotus macranthus (Greene)

Hosackia macrantha Greene, Bull. Cal. Acad. **1**: 81. 1885.

Lotus macranthus Greene, Pittonia **2**: 146. 1890.

Anisolotus maritimus (Nutt.)

Hosackia maritima Nutt.; T. and G. Fl. N. A. **1**: 326. 1838.

Lotus salsuginosus Greene, Pittonia **2**: 140. 1890.

Chamaesyce Rafinesquii (Greene)

Euphorbia Rafinesquii Greene, Pittonia **3**: 207. 1897.

Euphorbia hirsuta Wiegand, Bot. Gaz. **24**: 50. 1897; not *E. hirsuta* Schur. 1853, or *E. hirsuta* Kit. 1866.

Euphorbia hypericifolia var. *hirsuta* Torr. Fl. N. and Mid. States 331. 1826.

Chamaesyce hirsuta Arthur, Torreya **11**: 260. 1912.

Cryptanthe decipiens (Jones)

Krynitzkia decipiens Jones, Cont. West. Bot. **13**: 6. 1910.

This species was reported from Nevada by Jones in the publication cited above. Two other stations may now be added—*Kennedy 1838*, from Logan, Clark county, and *Heller 9632*, Rhyolite, Nye county. Both collections were made early in May, 1909. The species is evidently widely distributed in the southern part of the state.

Mohavea confertiflora (Benth.)

Antirrhinum confertiflorum Benth. in DC. Prodr. **10**: 592. 1846.

Mohavea viscida Gray, Pac. R. R. Rep. **4**: 122. 1857.

This rare plant may now also be credited to the flora of Nevada, for it was collected in the extreme southwestern point of the state near the Colorado river in March, 1911, by Mr. W. W. Robbins, of the Colorado Agricultural College.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 5

MUHLENBERGIA

MAY, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Ribes inebrians Lindl.

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University of Nevada,
Reno, Nevada

Volume 8 May 31, 1912

MUHLENBERGIA

THE FLORA OF THE RUBY MOUNTAINS—V

By A. A. Heller

Continued from page 24.

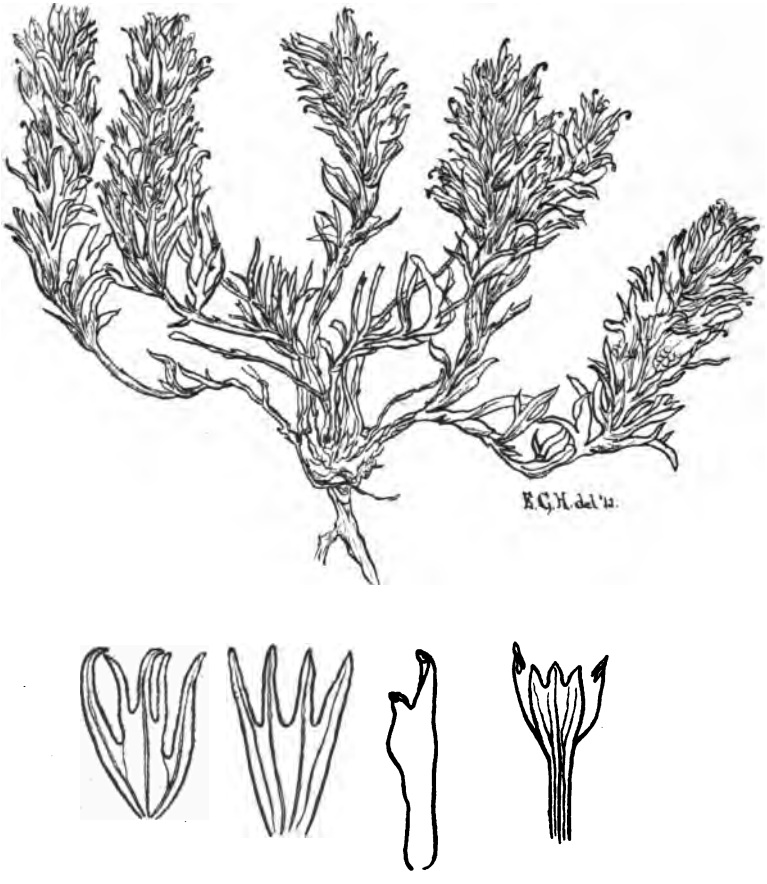
After a climb of about one hundred feet above the canyon proper, the axis of the main range was attained at 10300 feet. As is the case at the head of nearly all of the canyons, this was not the highest point in the immediate vicinity, but a "saddle" between two high points, one of which ran up to at least 11000 feet, but was not visited on account of the approach of midafternoon and a disinclination on my part to climb higher.

The ground about this point is decidedly barren, the only plants being low, stunted forms, and not many of them at that. At the crest, among the rocks, *Ivesia setosa* was plentiful, its short and thick stems rising from crevices wherever a little soil had collected. Here was also found an undescribed *Castilleja.*

Castilleja lapidicola n. sp.

Perennial, pubescent throughout with short, white tangled hairs: stems several from a slender perpendicular tap root, including the inflorescence 1 dm. high or less, decumbent, the inflorescence erect, the whole presenting a candelabra-like appearance, leafy: leaves 15 mm. long or less, the lowermost especially narrow, 1 to 2 mm. wide, bearing a pair of linear, divaricate lobes near the middle, 1 to 3-nerved, according to whether the leaf is simple or lobed, merging into floral bracts, which are purplish, cuneate in outline, the 3 lobes often further 2 to 3-lobed, their apices usually inrolled, more or less terete: inflorescence 7 cm. long or less, commonly 2 or 3 times the length of the stems: calyx 15 or 16 mm. long, a little deeper cleft in front than behind, the linear-lanceolate lobes nearly equal, cleft for

Plate 5



Castilleja lapidicola Heller. Enlargements, reading from left to right: Floral bract; calyx laid open; corolla; lower corolla lip laid open, with stamens attached.

6 or 7 mm.: corolla purplish, 18 mm. long, upper lip 5 mm. long, straight, acute, the lower 3 mm. long, moderately gibbous, 2 mm. wide, the broadly lanceolate lobes 1 mm. long, the lateral ones slightly incurved at apex: pod 11 mm. long, 5 mm. wide at the middle: seeds 2 mm. long, 1 mm. wide, shining, pitted.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9390*, collected August 11, 1908, at the head of the middle canyon of the South Fork of the Humboldt, above Lee post office, Elko county, Nevada, at an elevation of 10300 feet. The plants were growing on a bare slope almost devoid of vegetation, the surface closely packed with small stones and showing very little soil.

This species somewhat resembles *C. puberula* Rydb. from Colorado, but is much smaller, more pubescent, and has a very different flower. So far it and *C. inconspicua* Nelson and Kennedy, of western Nevada, are the only representatives of the group noted from the state.

After spending several days about Lee post office, another trip to the mountains being prevented by a rain storm at the lower elevations and snow in the mountains, we started on the morning of August 17th for Cave Creek in Ruby valley, on the east side of the range. A rain storm about midafternoon caused us to stop for the night at Toyn's, at the western entrance to Harrison pass, the Fremont pass of the King Report.

While Mr. Toyn's ranch, like all the others in the neighborhood, is chiefly devoted to the growing of hay, he has a large vegetable garden wherein are also bush fruits such as raspberries and currants, and an orchard containing pear, apple, cherry and plum trees. Fair crops of fruit are usually obtained from these trees. The elevation is 5700 feet.

The summit of Harrison pass lies at an elevation of 7000 feet, the formation granite. At places along the road, especially in the lower half of the ascent and below the granite, numerous springs seep out, and at several places small streams are crossed. Sheep have pastured extensively here, and many bare spots were in evidence. But few plants were obtained, one of the most interesting being a handsome white-woolly thistle which

grew about one of the wet places. It is related to *Carduus ochrocentrus*, and is probably the *C. undulatus* of the King Report, said to be common throughout Nevada and Utah.

On the east slope, just before going down into Ruby valley a species of juniper, identified as *Sabina utahensis*, was fairly plentiful. It is a small tree ten to fifteen feet high with a short trunk and generally well rounded crown. The species is fairly common at low and medium elevations in the limestone formation of the southern part of the Ruby range.

Ruby valley, on the east side of the range, lies at an elevation of about 6000 feet. It is perhaps ten miles wide, and the western side especially is more or less devoted to hay ranches. Our maps show two fair sized bodies of water, Franklin and Ruby lakes, but these lakes are little more than marshes covered with a dense growth of tules, *Scirpus occidentalis*, so that scarcely any clear water surface is exposed.

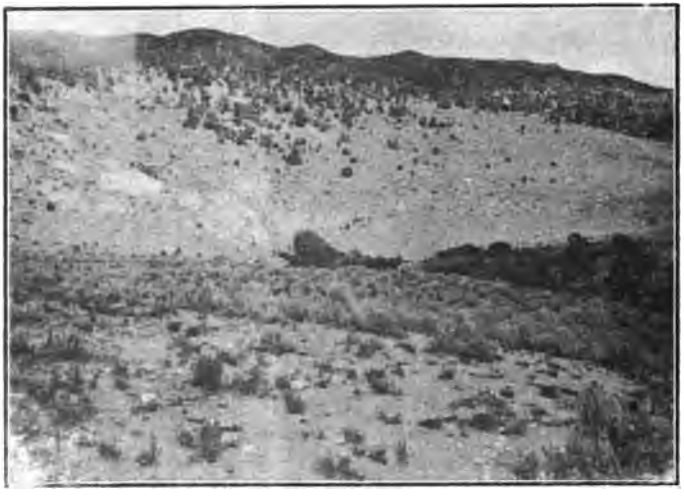


Figure 4. The source of Cave creek.

As mentioned in the first paper of this series, only two streams flow from the base of the mountains. The place where the larger of these, Cave creek, emerges from the range, is shown in the accompanying illustration. A sage brush covered

area is always present between the base of the range and the meadow lands, and this is shown in the foreground, while on the right a line of willows and cottonwoods marks the course of Cave creek. In the background is shown the sage brush covered lower slope of the mountain, the higher parts dotted with juniper and mountain mahogany, while the highest peaks dimly shown in the distance are generally without tree growth.

Camp was established at the ranch of Dr. Hager, about a mile below Cave creek, and three days were spent exploring the region. The dry sage brush area along the base of the ridge yielded *Chenopodium leptophyllum*, *Myzorrhiza multiflora*, *Lygodesmia spinosa*, *Gutierrezia diversifolia* and *Solidago pulcherrima*, while in the meadows in soil containing but little alkali the following were found:

Carex nebrascensis	Anthopogon detonsa
Scirpus occidentalis	Mimulus Langsdorfii
Astragalus nitidus	Lactuca pulchella
Chamaenirion angustifolium	Aster oxylepis
Glaux maritima	Solidago missouriensis
Amarella strictiflora	

Several alkaline areas produced by far the greater number of species found in the low land. They were:

Triglochin maritima	Nitrophila occidentalis
Agropyron tenerum	Sarcobatus vermiculatus
Distichlis dentata	Rumex persicarioides
Elymus triticoides	Radicula obtusa
Spartina gracilis	Ivesia Kingii
Sporobolus filiformis	Sium cicutaefolium
Scirpus campestris	Heliotropium spathulatum
Atriplex truncata	Crepis glauca
Chenopodium glaucum	Brachyactis frondosa
Dondia occidentalis	Pyrrocoma subviscosa

On August 20th the ridge above camp was ascended to 9300 feet, the line of least resistance in the shape of a canyon being followed up to 7300 feet. In fact, there are not many places in the immediate vicinity where an ascent can be easily made, on account of the precipitous rim rocks or terraces.

Near the mouth of the canyon, at 6250 feet was found the beautiful *Pentstemon macranthus* recently described by Miss Eastwood, the *P. Palmeri* of Watson's list. The throat of the large flower is very little constricted, reminding one somewhat of the flower of the foxglove. The inside of the lower lip is beautifully striped with dark purple. Near by was the humble but sweet scented *P. deustus.*

In moist soil on the floor of the narrow canyon at 6400 feet *Scutellaria nevadensis* occurred sparingly. The type of this was collected in the same county (Elko), but many miles further north on the other side of the range. Golden clumps of *Petradoria pumila* were found at 6600 feet near trees, and two hundred feet higher *Amelanchier utahensis* fringed the banks.

An interesting find at 7950 feet was *Opulaster alternans*, never definitely reported except from the type locality, Schell Creek mountains, on the eastern border of the state.

At 7200 feet, where a little moisture made its appearance, *Eucephalus elegans* and *Artemisia incompta* were found. *Artemisia graveolens*, which much resembles *A. incompta*, occurred in a similar situation at 8800 feet, but in slate. Up to 8000 feet the formation is limestone, the canyon walls presenting many openings or caves. Above 8000 feet slate was the predominant formation.

Several clumps of *Stanleya collina* were found at the base of a limestone cliff at 7600 feet. That this is a distinct species there can be no doubt.

The scattered growth of vegetation on the higher parts of the range at this place is well shown in the accompanying illustration, from a photograph taken at 9000 feet. This is about the upper limit of the mountain mahogany, *Cercocarpus ledifolius.* At 9300 feet vegetation was even more scanty, the closely packed gravel and stones supporting a scattered growth of *Tetraneuris Torreyana*, *Hymenopappus cinereus*, *Sitanion rigidum*, and a few other plants. The summit of the ridge here lies at about 10500 feet, and with the exception of a few trees of *Pinus flexilis* at about 9800 feet, was bare and barren looking.

Figure 5. Open growth of vegetation on the ridge above Cave Creek

Of the thirty-three numbers collected, the following have been determined up to date:

Melica stricta
Sitanion rigidum
Eriogonum microthecum
Caulanthus crassicaulis
Physaria acutifolia
Stanleya collina
Homalobus junceus
Amelanchier utahensis
Opulaster alternans
Linum Lewisii
Nuttallia laevicaulis
Epilobium alpinum
Pachylophus marginatus
Sphaeralcea rivularis
Batanthes attenuata
Scutellaria nevadensis
Pentstemon deustus
macranthus
Ptiloria exigua
Artemisia graveolens
incompta
Chaenactis achillaefolia
Eucephalus elegans
Hymenopappus cinereus
Petradoria pumila
Tetraneuris Torreyana

Having returned to Lee post office, a trip up Rattlesnake canyon was undertaken on August 25th. The place proved true to its name, for immediately upon entering the canyon a large rattlesnake was found sunning itself near the trail. Needless to state, there was soon one snake less in the region.

With the exception of *Eriogonum Baileyi* and *Acrolasia integrifolia*, found at 6400 feet before the canyon was entered, no plants were collected until an elevation of 8500 feet was attained, where a fine clump of *Salix Scouleriana* was growing in a meadow along the stream.

At 8800 feet in a marshy place there was an abundance of *Veratrum californicum.* I was surprised to find this species so far east. It probably does reach the Rocky mountains, and is found in western Oregon, but in northeaatern Oregon, in the Blue mountains, is replaced by *V. Jonesii.* While classed as a poisonous plant, I have seen many plants in both California and Nevada that had been eaten off by sheep.

A beautiful form of *Mimulus Lewisii* was found at 8900 feet. The flowers were deep crimson. The form occurring in the Sierra Nevada has pinkish flowers with yellow in the throat. A plant referred to *Ligusticnm Cusickii* by Dr. Rose was also plentiful.

Near the head of the canyon are several small lakes, and about one of these was what Dr. Greene says is an undescribed Oreostemma, and a beautiful one it is, the flowers bright violet.

At about 9600 feet the canyon ends, and one encounters the main range. The summit of the saddle lies at 10100 feet. On the steep slope at 10000 feet *Smelowskia americana*, the strange looking *Senecio seridophyllus*, and a plant provisionally referred to *Oreochrysum Parryi* were found.

On the crest of the saddle about rocks was *Achillea lanulosa.* This would probably be referred by Dr. Rydberg to his *A. alpicola* on account of its low stature and dark margined involucral bracts. We have the same thing, but two or three times taller, from near Reno, collected at 8000 feet. Both have very broad, notched ray flowers. Until better characters are assigned to *alpicola* than small size and dark margined bracts,

as opposed to larger size and light margined bracts in *lanulosa*, I can not separate it.

Passing along the saddle, the ascent of the high point on the north side was undertaken. On the way clumps of *Senecio cymbalarioides* with golden masses of flowers were found about rocks, and near by a handsome pale yellow flowered plant that has undergone many vicissitudes at the hands of botanists. I now intend to claim for it the rank of a genus, as Nuttall purposed to do many years ago. It is no more at home in either *Linanthus* or *Leptodactylon*, where it has recently been placed, than it is in *Gilia*.

Siphonella gen. nov.

Gilia § *Siphonella* Gray, Proc. Am. Acad. **8**: 266. 1870.

Siphonella Nuttallii (Gray)

Gilia Nuttallii Gray, Proc. Am. Acad. **8**: 266. 1870.

Linanthus Nuttallii Greene; Milliken, Univ. Cal. Pub. Bot. **2**: 54. 1904.

Leptodactylon Nuttallii Rydb. Bull. Torr. Club **33**: 149. 1906.

Since Gray described this in the place cited above, as well as in the Synoptical Flora under the section *Siphonella*, it is not necessary to repeat the description here. My impression of the plant is that it blooms in the day time, while all the species of *Leptodactylon* are nocturnal, opening early in the evening and closing the next morning. Their flowers also have a pleated appearance when closed, which is apparently not the case with those of *Siphonella*.

In damp soil about rocks at 10300 feet were *Drymocallis gracilis*, *Arnica mollis*, and *Epilobium obcordatum*. The latter is another of the species common also to the Sierra Nevada, but is found as far east as the Rocky mountains.

At 10850 feet, the highest point reached, *Pellaea Breweri* was found growing in crevices of the rocks. It is common in the Sierra Nevada, where it was first discovered.

Coming down from the high point, a beautiful Erigeron was found at 10200 in a moist meadow on the north side of the

canyon. It was distributed as "*Aster glacialis* Nutt.," but is probably not that species, and does not seem to agree with any of those recently described by Greene, Leaflets 2: 197-206.

The trip to Rattlesnake canyon was the last one, and though it yielded a comparatively small number of species, nearly all of them were of considerable interest.

During the six weeks spent on and about the Ruby mountains 552 numbers were collected. The entire range would no doubt yield not less than a thousand species if it were thoroughly explored. A number of species had undoubtedly bloomed and disappeared from the lower slopes, while the summits of the highest peaks should harbor many more. It is pretty certain that nearly every canyon contains a few species not found in adjacent ones. This I think can be shown by a comparison of the flora of Rattlesnake canyon with that of the middle canyon of the South Fork, separated by but one canyon, their heads close together.

While the greater number of the species found here seem to belong to the Rocky mountain flora, some few are local, and a small number are identical with species whose home is in the Sierra Nevada 350 miles to the westward, with no range of similar character intervening. The peculiar thing is that practically none of these species are found northward where the mountain systems merge more or less.

ALPINE PLANTS—IX

By P. Beveridge Kennedy

Alpine Currant

Ribes inebrians Lindl. Bot. Reg. *pl. 1471.* 1832.

We are glad to be able to illustrate from a photograph this much-named currant. The revision of the genus *Ribes* by Coville and Britton in North American Flora indicates that the plant has been given eight different names between the years 1832 and 1907, by about as many European and American botanists.

Figure 6. *Ribes inebrians* Lindl.

It is a remarkable shrub in that it occurs higher on the mountain than any other form of vegetation except lichens. The roots penetrate deeply into the crevices of the lava rocks, enabling it to withstand the fierce winds. The flowers, which appear in August, are white shading to pink, and the red berries, which are not especially palatable on account of their insipid taste and numerous seeds (9 to 14), are abundant in September. The photograph was taken on Mt. Rose, Washoe county, Nevada, at an elevation of 10800 feet.

NEW COMBINATIONS—IX.

By A. A. Heller

Micranthes odontoloma (Piper)

Saxifraga odontoloma Piper, Smiths. Misc. Coll. **50**: 200. 1907.

Saxifraga odontophylla Piper, Cont. U. S. Nat. Herb. **11**: 314. 1906; not Wahl.

Batidaea Egglestonii (Blanchard)

Rubus Egglestonii Blanchard, Torreya **7**: 140. 1907.

Anisolotus hirtellus (Greene)

Lotus hirtellus Greene, Pittonia **2**: 142. 1890.

Hosackia strigosa var. *hirtella* Hall, Univ. Cal. Publ. Bot. **4**: 198. 1912.

Anisolotus Mearnsii (Britton)

Hosackia Mearnsii Britton, Trans. N. Y. Acad. **8**: 65. 1889.

Lotus Mearnsii Greene, Pittonia **2**: 144. 1890.

Anisolotus mollis (Greene)

Hosackia mollis Greene, Bull. Cal. Acad. **1**: 185. 1885.

Lotus mollis Greene, Pittonia **2**: 143. 1890.

Anisolotus neo-mexicanus (Greene)

Lotus neo-mexicanus Greene, Pittonia **2**: 144. 1890.

Ditaxis californica (Brandegee)

Argithamnea californica Brandegee, Zoe **5**: 230. 1906.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 6

MUHLENBERGIA

JUNE, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Chrysothamnus monocephalus Nelson and Kennedy

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University of Nevada,
Reno, Nevada

Volume 8 July 23, 1912

MUHLENBERGIA

THE NORTH AMERCAN LUPINES—VI.

By A. A. Heller

Polyphylli Heller, Muhlenbergia **6**: 15. 1910.

My description of this section must be emended in one respect. The basal leaves are not always long petioled, for in certain members of the group, as *L. procerus*, they are short, only 1 dm. long. The stems are simple. Agardh, Synopsis 16, describes a tribe Polyphylli, but includes in it such species as *minimus* and *lepidus*, which are not at all related to *polyphyllus*. He also puts here *latifolius* and *cytisoides*, but these in my opinion should go into another section.

The Polyphylli as a whole are moisture loving plants, and are commonly found in swampy places, in moist meadows, or on stream banks close to the water. *L. polyphyllus* itself often acts at variance with this rule, growing on grassy slopes away from water, but it occurs in a region where there is an abundant rainfall, and apparently does not need the extra moisture. The members of this section are widely distributed, occurring from the immediate vicinity of the Pacific coast to the Rocky mountain region. The following species belong to this section:

Lupinus apodotropis Heller, Muhlenbergia **7**: 14. 1911.
Eastern Oregon.

Lupinus barbatus (Henderson)
Lupinus ligulatus barbatus Henderson, Bull. Torr. Club **27**: 345. 1900.

The type of this plant, in the Gray Herbarium, is certainly distinct from *L. ligulatus*. Southern Oregon.

LUPINUS BURKEI Wats. Proc. Am. Acad. **8**: 525. 1873.
"Snake country (Burke)."

LUPINUS ELONGATUS Greene, Muhlenbergia **6**: 17. 1910.
Western Nevada.

LUPINUS GRANDIFOLIUS Lindl.; Agardh, Syn. 18. 1835.
Lupinus magnus Greene, Pittonia **3**: 160. 1897.

I feel quite sure that Greene's *L. magnus* is the same as *L. grandifolius*. This large leaved species, found in the coast region of California, especially in Marin county, is very distinct from the northern *L. polyphyllus*.

LUPINUS LIGULATUS Greene, Pittonia **1**: 215. 1888.
Southeastern Oregon.

LUPINUS LONGIPES Greene, Flora Franciscana 41. 1891.

No type is designated for this species, and in the cover in Dr. Greene's herbarium there are two things under this name. The broad leaved plant, from Summit if I remember rightly, is *L. procerus*. The seed is mentioned in the description, and the only specimen that shows both flowers and mature fruit, is the one collected by Mrs. Austin in Modoc county, California, but it was collected in August, 1894, and therefore can not be taken as the type. However, it seems to represent typical *longipes* according to the description. California and perhaps western Nevada in the Sierra Nevada.

LUPINUS PALLIDIPES Heller, Muhlenbergia **7**: 91. 1911.
Western Oregon.

LUPINUS POLYPHYLLUS Lindl. Bot. Reg. **13**: *pl. 1096*. 1827.
Western Washington and Oregon.

LUPINUS PRATENSIS Heller, Muhlenbergia **2**: 210. 1906.

This is a somewhat aberrant member of the group, having narrower leaves and smaller flowers than usual, but in habit it belongs to this section. Inyo county, eastern California.

LUPINUS PROCERUS Greene, Muhlenbergia **6**: 19. 1910.
Western Nevada.

LUPINUS RETRORSUS Henderson, Bull. Torr. Club 27: 344. 1900.
Northern Idaho.

LUPINUS SUPERBUS Heller, Muhlenbergia 2: 209. 1906.
Inyo county, eastern California.

LATIFOLII

Herbaceous perennials frequenting woodlands and borders of thickets. Stems rather tall, up to about 10 dm., more or less branched, not succulent, sparingly pubescent with short appressed hairs. Basal leaves smaller than those of the middle part of the stem, the petioles not elongated. Flowers violet, subsymmetrical at base. Plants of the Pacific slope.

This is part of the section Rivulares of Piper's Flora of Washington, also made to include the Polyphylli. But the name Rivulares can not stand, for none of the plants mentioned there are related to *L. rivularis.*

Lupinus confusus sp. nov.

Perennial (§Latifolii): stems several in clumps from a thick rootstock, about 9 dm. high, more or less purplish and pubescent with short appressed hairs, especially the lower part and the inflorescence, rather stout, about 6 mm. in diameter below, leafy: leaves rather remote; leaflets about 9, elliptical-oblanceolate, those of the middle part of the stem 5 or 6 cm. long, 1.5 cm. wide, the uppermost and lowermost somewhat smaller, bright green and glabrous above, paler and somewhat appressed pubescent beneath, midvein prominent on both surfaces, ending in a short cusp at the acutish apex; petioles equaling or somewhat exceeding the blade; stipules subulate, 1 cm. long, villous: peduncles short, 4 cm. long or less: inflorescence elongated, often 3 dm., rather dense: flowers violet, whorled, about equaling the internodes: bracts caducous, subulate, 15 mm. long, villous as well as pubescent with short appressed hairs: pedicels slender, 7mm. long, sericeous with short drab hairs, as is also the calyx: upper calyx lip 7 mm. long, notched, broadly lanceolate and 4 mm. wide at base when spread out; lower lip 8 mm. long, entire, lanceolate, 2.5 mm. wide at base when spread out; a small

bractlet 1 mm. long on the outside of the calyx *below* the sinus: corollas 15 mm. long, 11 mm. deep, 5 mm. between apices of banner and wings; banner with edges turned back and inrolled or meeting, the face very narrow, the apex produced dorsally into a keel-like point, the whole orbicular-ovate, 1 cm. wide when spread out; wings moderately inflated, the lower edges meeting, not exposing the keel, united only at the apex for a space of about 2.5 mm., rounded-oblique, 9 mm. deep at the middle; keel strongly curved, the lower half shortly ciliate, the apex purple: fruit not seen.

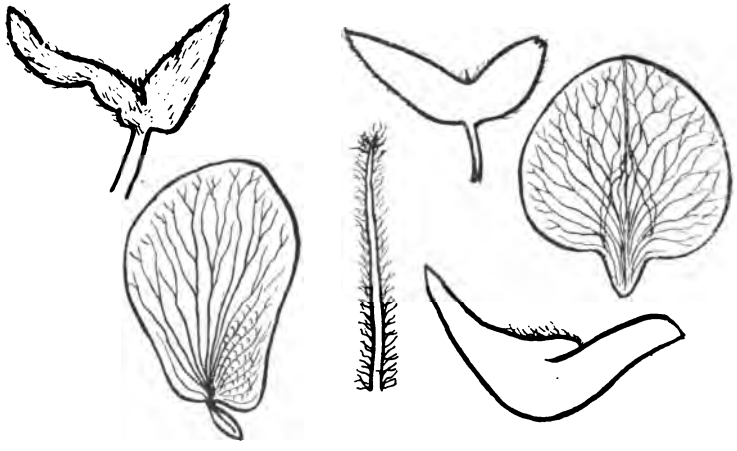

Figure 7. Floral parts of *Lupinus confusus*, enlarged.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10107*, collected May 26, 1910 on Hood river, near Hood River, Wasco county, Oregon. The plants were growing in low moist ground about a mile and a half above the junction of Hood River with the Columbia.

This is probably the *L. rivularis* of Piper's Flora of Washington, as it is one of the species that has been masquerading under that name since 1873. It seems to be most closely related to *L. latifolius*.

The following species, in addition to *L. confusus*, belong to the Latifolii.

LUPINUS ADSURGENS Drew, Bull. Torr. Club **16**: 150. 1889.

According to Greene, Flora Franciscana 41, this is a synonym of *L. latifolius*. It was originally collected in northwestern California, in Humboldt county. The description is so vague that it might be any one of a dozen well known species. The flowers are said to be light yellow, an unusual color for this group.

LUPINUS CYTISOIDES Agardh, Syn. 18. 1835.

Collected in California by Douglas, perhaps in the neighborhood of Santa Barbara, which place was the southern limit of his journey in California. The species is not well known, but is evidently distinct from *latifolius*.

LUPINUS LATIFOLIUS Agardh, Syn. 18. 1835.

Also collected in California, and probably near Monterey. Recent specimens from the vicinity of Monterey seem to correspond fairly well with the original. One of them is my *6680*, collected near Del Monte in 1903.

LUPINUS VIRIDIFOLIUS Heller, Muhlenbergia **2**: 64. 1905.

Northern California on the upper Sacramento river.

This section is confined to the Pacific slope, the species usually occurring at rather low altitudes. *L. confusus* is the only one thus far recorded from the eastern side of the great mountain range which separates the Pacific coast region from the dry interior, but its presence there can be accounted for by the fact that a gateway is found for the distribution of such species along the Columbia river, a condition not found at any point south of this stream.

ARBOREI Agardh, Syn. 24. 1835.

This is Agardh's tribe H., which he describes as having "stems decumbent and persistent, the calyx ebracteolate, deeply bilabiate, keel ciliate." He also describes *L. arboreus* as having a sub-frutescent, decumbent stem, which is never the case, as it is always distinctly woody, and is certainly never normally decumbent. However, nearly all of the species are decumbent at the woody base. The flowers are among the largest in the

genus, the herbage smooth appearing, and the lower calyx lip very broad. With the exception of the species described here, they are all plants of the immediate coast region. This new plant was found about fifty miles inland.

Lupinus lignipes sp. nov.

Perennial (§Arborei): woody stems prostrate, 1 cm. or less in diameter, herbaceous branches of the season erect, stout, hollow, 3 to 4 dm. long, numerous, the whole forming a compact clump 4 to 6 dm. across, the stems pale, somewhat pubescent with short, appressed, clear white hairs, sparingly leafy: leaflets commonly 7, elliptical-oblanceolate, 3.5 cm. long or less, 8 mm. wide or less, bright green and glabrous above, paler beneath

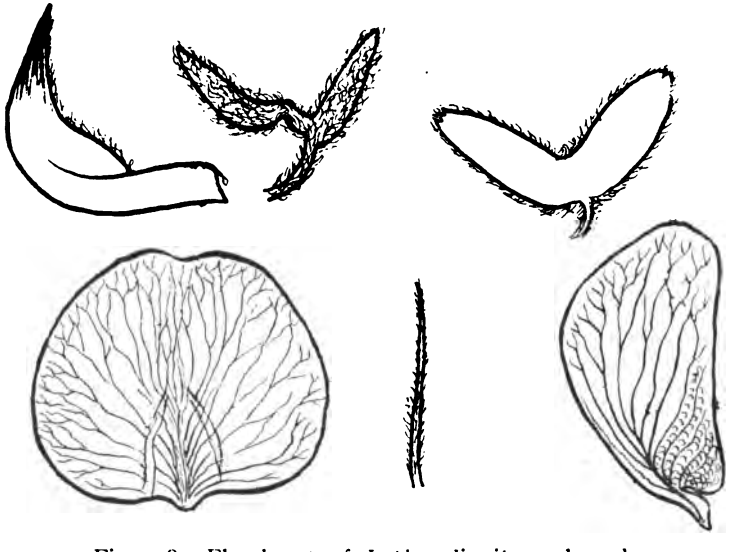

Figure 8. Floral parts of *Lupinus lignipes*, enlarged

with short appressed hairs, the lowermost ones the smallest, the apex rounded, the larger upper ones acute or acutish; petioles slender, pubescent like the stem, 3 to 5 cm. long; stipules subulate, 1 cm. long, the apex incurved: peduncles rarely over 8 cm. long, about the length of the inflorescence: flowers in about four whorls, large, violet and white: bracts subulate, 1cm.

long, pale, falling away early: pedicels slender, 1 cm. long, short villous, as is the calyx: upper calyx lip 8 mm. long, split at the apex for 2 mm., the sinus closed, the whole broadly lanceolate when spread out, 4mm. wide at base; lower lip shortly 3-toothed, oblong when spread out, 4 mm. wide at base, nearly 2 mm. at apex: corollas 13 mm. long and as deep, distance between apices of banner and wings 7 mm.; banner with edges turned back and parallel, violet, lower part of the face yellow with purple dots, the middle and upper parts white, the whole orbicular when spread out; wings violet but paler on the sides, moderately inflated, completely inclosing the keel, united for 5 mm. at the apex, 9 mm. deep across the middle; keel sparingly short ciliate on the lower half, 4 mm. deep at the middle, strongly curved, the apex purple: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10042*, collected May 18, 1910, near Eugene, Lane county, Oregon, along the railroad in low, moist, grassy places.

It is a handsome species, the well rounded clumps covered with large violet and white flowers presenting a pleasing appearance. The casual observer would probably fail to note the true character of the plant, for the trailing woody stems are hidden in the grass. Its nearest relative is *L. variicolor*, from which it differs in much greater size, heavier woody branches, larger and more succulent herbaceous stems, narrower aud paler bracts, narrower and more silky calyx, aud larger and paler flowers.

There is a specimen of it in my *variicolor* cover, *H. E. Brown 718*, collected near Mendocino, California, June, 1898. In 1898 I collected it at Montesano, western Washington, and distributed it as *L. littoralis*. The plant from "Crescent City," Del Norte county, California, collected by Howell, and mentioned by Greene when describing *L. propinquus* (Erythea **1**: 126), is also this species.

LUPINUS RIVULARIS Dougl.; Lindl. Bot Reg. **19**: *pl. 1595*. 1833.

"L. *rivularis;* perennis, subsericeus, viridis, caule herbaceo, foliolis 7 petioli longitudine subtus levissime pubescentibus,

racemis verticillatis, bracteis pedicellis subaequalibus, calyce ebracteato: labiis integerrimis superiore basi gibboso, vexillo sessili alis sessilibus parallelo et aequali.

"L. rivularis. *Douglas in litt.*

"Perennis. Caules erecti, bi-tripedales, pallide virides, levissime pubescentes. Poliola saepius 7, anguste obovato-oblonga, obtusiuscula, subcarnosa, apice recurva, subtus levissime pubescentia, petioli longitudine. Stipulae parvae, subfalcatae, erectae. Racemi verticillati, multiflori, fere glabri. Verticilli subsexflori. Bracteae lineares, acutae, pedicellis paulo longiores, citissime deciduae. Calyx ebracteolatus, bilabiatus, labio superiore ovato, basi gibboso, inferiore longiore, cymbiformi, indiviso, obtuso, subcarinato. Vexillum sessile, subrotundum, emarginatum, fere album, roseo paululum tinctum, basi coeruleo puro maculatum, alarum longitudine; alae sessiles, oblongae, obtusae, ventricosae, caeruleo-violaceae: carina alba, apice purpurea, rostrata, margine ciliata. Stamina omnino monadelpha.

"A native of California, whence seeds have been recently sent to the Horticultural Society. It forms a handsome hardy perennial, flowering in great profusion from May to September. In some respects this is even a better species for Gardens than *L. polyphyllus;* for, if less stately, it is more gay in its appearance, and a longer flowerer. The diversity of colours in the petals no doubt contributes very much to this effect, which is increased by its loose, but not straggling mode of growth.

"That this is very distinct from all the Lupines yet in our Gardens, no one who is acquainted with these plants would for a moment doubt. Yet it is most difficult to point out any positive characters by which it may be defined. It varies apparently in the degree of hairiness of its leaves and branches; and seems better distinguished by its pubescence being of the silky kind, by its short bracteae, and by its ebracteolate calyx, than by anything else that can be mentioned. J. L."

The above is a copy of the original description of *L. rivularis*. The next description was by Agardh in Synopsis Generis Lupini 24. 1835. He included it under his tribe Arborei, placing it before *L. arboreus*, and notes that he has seen a wild

Plate 6

Lupinus rivularis Dougl. Copied from the Botanical Register.

specimen in the herbarium of Lindley. He changes the character of the stem from "erect" to "subfrutescent, decumbent," and in this is followed by Torrey and Gray, Fl. N. A. **1**: 376. 1840. They indicate that they had seen a specimen collected by Douglas, but at the present time there seems to be no specimen extant in this country, with the exception of a fragment in the Gray Herbarium, consisting of a couple of leaves, several flowers and pods.

In 1873, Watson, in Proc. Am. Acad. **8**: 525, says: "The species has been known only from the figure (*Bot. Reg.* 19, *t.* 1595) and a cultivated specimen in Herb. Lindley. These seem to accord sufficiently well with the ordinary *L. cytisoides* Agh., and the older name is retained."

Watson's disposition of the species has been accepted by botanists without question up to the present time, with the exception of Greene, who in Flora Franciscana 46, treats *rivularis* as a synonym of *arboreus*. It seems strange that Watson should have ignored the judgment of botanists who had seen the original, and transferred the name to an entirely different group, the Latifolii, not seeing the differences that are to be found in the descriptions of *rivularis* and *cytisoides*.

About two years ago, Miss Eastwood, then at the Gray Herbarium, wrote me that *L. propinquus* Greene, is probably the same as *rivularis*, and that my *6804* from Carmel bay, California, may be the same, a conclusion I had also arrived at independently. Early this year she wrote from London, with one of my specimens before her, that "6804 is probably *L. rivularis*."

Last summer while at the Gray Herbarium, I noted the following concerning the plant here described as *L. lignipes:* "May be *L. rivularis*. There are a couple of leaves in the Gray Herbarium which agree almost perfectly, but the flower is smaller. Smooth pods." This fragment and the older descriptions have somewhat shaken my belief that the upright shrubby plant from Carmel bay is true *rivularis*. There is considerable evidence to show that *rivularis* and *variicolor* may be identical. *L. variicolor* has a smaller flower than either *arboreus* or the Carmel bay plant, and Lindley's reference to "the diversity of

colours in the petals," and "its loose, but not straggly, mode of growth," rather strengthens the supposition. The pods of *varii-color* are more nearly smooth than are those of the other species.

Whatever may be the true status of *rivularis*, it certainly belongs to the Arborei and not to the Latifolii where Watson placed it.

Besides *L. lignipes* and *L. rivularis* the following names belong to the Arborei:

LUPINUS ARBOREUS Sims, Bot. Mag. *pl. 682.* 1803.

The native country of this species was unknown when it was published, and for some time the type was thought to have come from South America. It was no doubt collected at Monterey, California, where it is plentiful in sand near the coast.

LUPINUS EXIMIUS Davy, Erythea **3**: 116. 1895.

Although the type of this is in the herbarium of the University of California, Jepson does not mention it in his Flora of Western Middle California, either as a valid species or as a synonym. It is certainly distinct and is a handsome large violet flowered species, originally collected "above Lake Pilarcitos, San Mateo Co., Calif." It is apparently also found on Mt. Tamalpais north of San Francisco. The only montane species in the group.

LUPINUS PROPINQUUS Greene, Erythea **1**: 126. 1893.

Originally collected at Santa Barbara, California, and said to occur as far north as Point Reyes.

LUPINUS VARIICOLOR Steud. Nomen. **2**: 78. 1841.

Lupinus versicolor Lindl. Bot. Reg. *pl. 1970;* not Sweet, Brit. Fl. Gard. **2**: *pl. 12.*

Lupinus franciscanus Greene, Pittonia **1**: 64. 1887.

Originally collected by Douglas, undoubtedly about Monterey, where it is plentiful. Jepson. in the second edition of his Flora says "too near the next" (*L. Chamissonis*), which does not at all resemble it, being related rather to *L. albifrons*, which as I see it, does not belong to the Arborei.

ALPINE PLANTS—X

By P. Beveridge Kennedy

Alpine Rabbit Brush

Chrysothamnus monocephalus Nelson and Kennedy, Proc. Biol. Soc. Wash. **19**: 39. 1906.

Figure 9. *Chrysothamnus monocephalus* Nelson and Kennedy

The genus *Chrysothamnus* and allied genera need revision perhaps more than any other large group of western plants. Unfortunately, they are of little or no forage value, although covering large areas in the Great Basin region.

This alpine species of *Chrysothamnus* which we here illustrate was described as new in 1906. It is a rigid shrub about a foot high, with numerous short divaricate branches, sharp pointed leaves and insignificant pale yellow flowers. It grows among lava rocks on Mt. Rose, Washoe county, Nevada, at from 10000 to 10800 feet elevation.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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539 West 5th street, Reno, Nevada

Volume 8 Number 7

MUHLENBERGIA

JULY, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Pinus Jeffreyi. A mature tree on the mountains north of Verdi, Nevada.

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Volume 8 August 10, 1912

MUHLENBERGIA

PINUS PONDEROSA AND PINUS JEFFREYI

By A. A. Heller

About two years ago a student of the University of Nevada who proposed to take up the study of forestry, came to me for instruction in dendrology. Up to that time I had given no special thought to our trees, but now this fascinating branch of botany is one of my special studies, and a regular course in dendrology is being given in the College of Agriculture.

The Sierra Nevada mountains, lying some ten miles west of Reno, are timbered, especially on the lower slopes, with what is commonly known as western yellow pine. A few scattered trees even find their way along the dry hills north of us. During the course of my work came the problem of naming this pine. Sargent's Manual, Britton's North American Trees, and Jepson's Silva of California credit this region with *Pinus ponderosa* and what they call the variety *Jeffreyi*, but none of these works give any definite or precise information concerning the distinguishing characters of the two forms. One gets a vague impression that *Jeffreyi* may be recognized by its larger cones. Finally, this spring after consulting Sudworth's Forest Trees of the Pacific Slope, issued by the Forest Service at Washington, I got some real information. Sudworth treats *Jeffreyi* as a species and describes it intelligibly, a thing that is rarely done when a varietal name is used. His book is the best thus far issued, not only in point of information but of illustrations as well. After studying his descriptions of *ponderosa* and *Jeffreyi* I was soon able to readily distinguish the two, and a little comparison showed that quite young trees are as clearly differentiated as mature ones. The blue-green leaves and smooth gray

Plate 7

Pinus Jeffreyi. A mature tree on the mountains north of Verdi, Nevada.

Plate 8

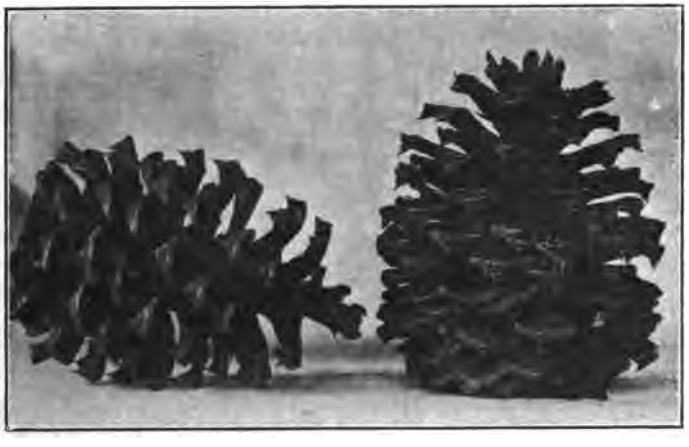
Pinus ponderosa. Mature tree above Dog valley, California.

Plate 9

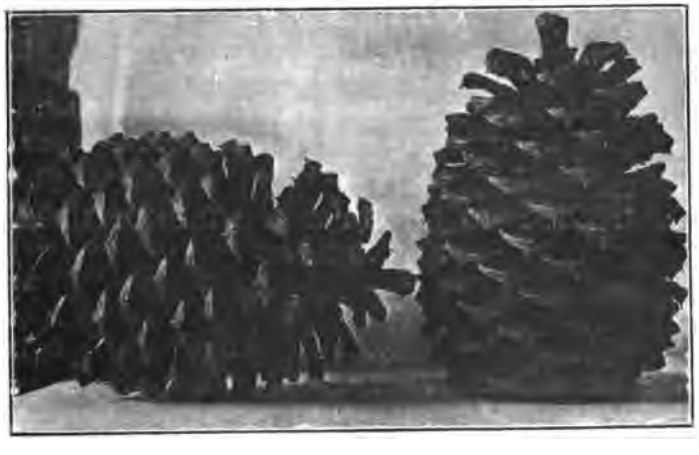
Pinus ponderosa, near Verdi, Nevada

Pinus Jeffreyi, Verdi, Nevada

Plate 10



Pinus ponderosa, Floriston, California



Pinus Jeffreyi, Verdi, Nevada

bark of young *Jeffreyi* are in striking contrast to the bright or apple-green leaves and rough brown bark of *ponderosa* of equal age.

Pinus ponderosa was discovered May 12, 1826, in the vicinity of Spokane, Washington, by David Douglas. It is widely distributed, according to Sudworth, "occurring in every State west of the Great Plains and one hundredth meridian," and is also found in northern Mexico proper as well as Lower California. If *P. scopulorum* of the Rocky mountains, which he includes in this range is excluded, the statement must be modified.

Pinus Jeffreyi was first collected October 24, 1852, in Shasta valley, or more probably on the edge of Shasta valley, in northern California, by John Jeffrey. The northern limit of the species is Douglas county, Oregon, according to Jepson, Silva 81, and is found as far south as Mt. San Pedro Martir, Lower California. It is also the chief timber tree of western Nevada as it is found in greatest abundance on the eastern slope of the Sierra Nevada.

Since this paper is but preliminary to an exhaustive study of the two species as they occur in Nevada, I shall merely point out the chief differences, and with the accompanying illustrations it should not be difficult to distinguish them. Some persons claim that *Jeffreyi* merges into *ponderosa*, but I think this is not the case. While *Jeffreyi* is the predominant tree in western Nevada, *ponderosa* is more or less mixed with it. The bark of mature trunks is, of course, somewhat variable, but there is enough sameness in the members of the one species to distinguish them from the other. Even the smallest cones of *Jeffreyi*, but little larger than the maximum ones of *ponderosa*, are easily separated by the broader, rather thinner scale with a slender, usually downcurved prickle. The seeds are nearly twice larger, much more mottled, and are of a different shape. The two species are much alike in habit and have leaves of about equal size, and this is about all that they do have in common.

P. PONDEROSA

Seed leaves 5 to 9.

Bark of young trees scaly, light brown.

Bark of old trees russet-red, divided into broad, rather regular plates.

Young shoots with a strong odor of orange when broken.

Leaves bright yellow-green, persisting about three years.

Wood fine grained, with thick heartwood.

Cones 3 to 6 inches long, 2½ to 3½ inches thick.

Cone scales usually widely spreading, the largest about 2 cm. wide, thickened at apex, prickle stout with a broad heavy base.

Seeds 8mm. long, 5mm. wide, slightly mottled; wing about 23 mm. long, widest at the middle.

P. JEFFREYI

Seed leaves 7 to 10.

Bark of young trees nearly smooth, gray.

Bark of old trees dark red-brown, deeply furrowed and the ridges usually narrow.

Young shoots with a violet-like odor when broken.

Leaves blue-green, persisting five to eight years.

Wood coarse grained, with little heartwood.

Cones 6 to 11 inches long, 4 to 5 inches thick.

Cone scales not usually wide spread, the largest 2.5cm. wide, moderately thickened at apex, prickle slender, downcurved from a low, broad base.

Seeds 14 mm. long, 7 mm. wide, prominently mottled; wing about 20 mm. long, widest above the middle.

ADDITIONS TO THE FLORA OF SOUTHERN CALIFORNIA

By S. B. Parish

The plants in the following list consist of two classes. First, plants from the north now reported from stations which are their present known southern limit. As they are, with two exceptions, natives of the high Sierra Nevada, there is little geographical opportunity for their further extension southward. Second, plants of recent introduction into southern California, and all of them, I think not heretofore recorded from the

state. The most are as yet hardly more than casuals, and may never succeed in obtaining a permanent place in our flora. Some, however, are weeds of wide distribution, and may have a future before them. In this event a record of first appearances will be of historical interest.

PANICUM MILIACEUM L. Sp. Pl. 58.

In cultivated fields, Riverside, October, 1910, *F. M. Reed 3112.*

POA NERVOSA (Hook.) Vasey, Ill. N. Am. Grasses **2**: 81.

West canyon, Palm Springs, Colorado desert, April 18, 1907, *Parish 6141.* This and the following species were identified by Professor A. S. Hitchcock.

POA HOWELLII V. & S. var. MICROSPERMA Vasey, Cont. U. S. Nat. Herb. **1**: 273.

Waterman canyon, San Bernardino mountains, at 3000 feet altitude, May 29, 1906, *Parish 6206.* The type was collected at Santa Cruz.

ECHINODORUS CORDIFOLIUS (L.) Griseb. Abh. K. Ges. Wiss. Goett. **7**: 257. *E. rostratus* Engelm.

According to Small (N. Am. Flora **17**: 47) this plant does not extend west of Texas, but specimens collected by Davidson at Garvanza, and my no. *2246* from mud flats at Elsinore, are unmistakably of this species. Small credits *E. radicans* Engelm. to southern California, but I have seen no material from our region that could possibly be referred to that very distinct species.

ASPHODELUS FISTULOSUS L. Sp. Pl. 309.

Bryn Mawr, San Bernardino valley, 1909, *Professor George Robertson.* This old world plant is abundantly naturalized in northern Mexico, but has not been reported heretofore from the United States. It probably owes its presence at Bryn Mawr to the Mexican settlement at that place. Identified by Professor Fernald.

LIMNORCHIS LAXIFLORUS Rydb. Bull. Torr. Club **28**: 630. *f. 23.*

Whitewater Basin, August, 1909, *Mrs. C. M. Wilder.* Type collected in Oregon. Identified by Dr. Rydberg.

CYCLOLOMA ATRIPLICIFOLIUM Coulter, Mem. Torr. Club **5**: 143.

Near Rialto, June, 1909, *Mrs. C. M. Wilder.* A plant of the plains region.

SANICULA ARCTOPOIDES H. & A. Bot. Beechey 141.

El Monte, Los Angeles county, May 17, 1906, *George B. Grant 2616.* Not known heretofore south of Monterey.

AGROSTEMMA GITHAGO L. Sp. Pl. 435.

In a lemon grove near San Bernardino, March, 1912, *Miss H. E. Brayton;* in an orchard, June 15, 1912, *Parish 8053.*

PYROLA PALLIDA Greene, Pittonia **4**: 39.

Whitewater Basin, San Bernardino mountains, August, 1909, *Mrs. C. M. Wilder.* This species was founded on plants collected on Mt. Shasta, and the present collection brings it to the southern end of the state. I have seen specimens from the Yosemite, and the plant no doubt occurs at intermediate points.

LYCIUM BARBINODUM Miers, Ill. S. Am. Pl. **2**: 115. *pl. 68.*

Occasional in waste places about San Bernardino. Brookside Park, June, 1911, *Parish 8046.*

SOLANUM ROSTRATUM Dunal, Sol. 234. *pl. 24.*

Mentone, San Bernardino valley, 1911, *Professor George Robertson.*

PLANTAGO ELONGATA Pursh, Fl. Am. Sept. 729.

Collected several years ago, at San Diego, by *Brandegee.* This species is native in Oregon, but has not been known heretofore from California. Whether native or introdnced at San Diego is noubtful.

GALIUM BIFOLIUM Wats. Geol. Expl. 40th Par. **5**: 134. *pl. 14.*

Bear valley, San Bernardino mountains, 6500 feet altitude, July, 1909, *Dr. A. Davidson 2291.*

LACTUCA SCARIOLA L. Sp. Pl. ed 2, 1119.

The form of prickly lettuce heretofore reported from California has been the variety *integrata* Gren. & Godr., distinguished by its spinulose-toothed leaves. The species, which has runcinate or pinnately lobed leaves, is now abundantly established about Urbita, a suburb of San Bernardino.

HELIANTHUS PETIOLARIS Nutt. Journ. Phila. Acad. **2**: 115.

In Hall's Compositae of Southern California this species is credited to our region on my authority, founded on a single collection made at Fredalba Park. The specimen is no longer in existence, and its authenticity is uncertain. But in recent years the plant has become very common in alfalfa fields, in some parts of San Bernardino valley, where it has perhaps been introduced in the seed of barley, which is planted as a shade crop in starting alfalfa. It is probably never native in our region.

San Bernardino, California.

THE NORTH AMERICAN LUPINES—VII.

BY A. A. HELLER

Lupinus borealis sp. nov.

Perennial: stems simple, 3 dm. high, somewhat villous hirsute, rather slender, about 3 mm. in diameter, not fistulous, leafy throughout: leaves large and long petioled for the plant; petioles, except the few uppermost, 10 to 14 cm. long, rather stout, the lowermost with enlarged base 4 or 5 mm. wide; stipules linear subulate, 1cm. long, villous; leaflets 7 to 9, elliptical-oblong, acute, mucronate, 6 or 7 cm. long, 1.5 cm. wide, dull yellow green and glabrous above, paler and sparingly appressed villous below, the yellowish midvein prominent beneath: peduncle short, about 3 cm., a little exceeded by the inflorescence: flowers violet, somewhat whorled, 13 mm. long and as deep, subsymmetrical at base, distance between apices of banner and wings 5 mm.: bracts lance-acuminate, 1 cm. long, 2 mm. wide at base, densely villous, as are pedicels and calyx: pedicels rather slen-

der, 5 mm. long: upper calyx lip 5 mm. long, 2 lobed, the sinus nearly 2 mm. deep, the apices 1 mm. apart, the whole broadly ovate, 5 mm. wide at base when spread out; lower lip 7 mm. long, 3-toothed, 2 mm. wide at apex, 4 mm. at base when spread out; subulate bractlet *at the base* of the calyx, extending to the sinus: banner with edges turned back and parallel or somewhat inrolled, face rather broad, white or yellowish, fading purple, the protruberances at the joint prominent and keel-like; wings rather broadly inflated, the lower edges closed, not exposing the keel, upper edges probably closed, with a depression on either side, the whole 8 mm. deep at the middle; keel strongly curved, 5 mm. deep at the middle, glabrous, the apex purplish: fruit not seen.

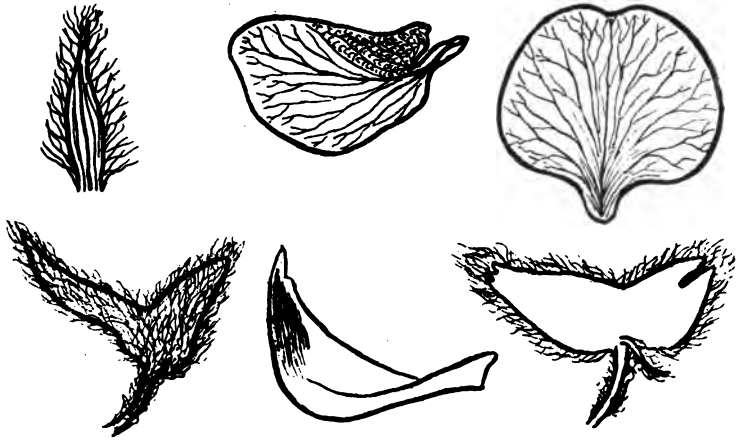


Figure 11. Enlarged floral parts of *Lupinus borealis*.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *John Macoun 58426*, collected July 9, 1902, at Rink Rapids, Klondike river, Yukon Territory.

This handsome, large flowered species should probably be grouped with *L. Wyethii*, although at present I do not know its exact relationship. Another plant which I also refer to *L. borealis* is *John Macoun 58427*, collected on Hunker creek, Yukon Territory, July 24, 1902. It has narrower leaves, and being a more mature plant, has a larger inflorescence. Older plants

would probably show an inflorescence two or three times as long as the type, which has unopened flowers at the apex of the spike.

LUPINUS WYETHII Wats. Proc. Am. Acad. **8**: 525. 1873.

Last summer I looked for the type of this species in the Gray Herbarium, where presumably it should be found, but did not notice it there. Wyeth collected it on the "Flathead River, Oregon." The type may be in the herbarium of the Philadelphia Academy, as many of Wyeth's specimens are there. The Flathead river of Wyeth is Clark's Fork of the Columbia, and the plant was probably collected in what is now the state of Montana. The other specimen mentioned by Watson, collected by Spalding on the Clearwater I have seen, and have also found the same thing along that stream, but doubt whether it is identical with Wyeth's plant. It may be that Watson used Spalding's plant when writing the description, but that can be decided only after a careful examination of the two.

Lupinus columbianus nom. nov.

Lupinus confusus Heller, Muhlenbergia **8**: 63. 1912; not *L. confusus* Rose, Cont. U. S. Nat. Herb. **8**: 307. 1905.

It seems that I have no good excuse to offer in the case of this homonym, for Rose's name is plainly listed in the third supplement to the Index Kewensis. *L. confusus* Rose, is a Mexican species.

LUPINUS PALLIDUS Brandegee, Zoe **4**: 203. 1893.

The type of this was collected in "sands in the dry bed of the creek near the Mission of San Vincente in northern Baja California, May, 1893," by Brandegee. It is an annual, perhaps referable to the Micranthi, and has been collected at a number of places in San Diego county, California. *L. desertorum* Heller, may be a synonym, but as yet I have had no opportunity to dissect and compare the flowers.

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Entered as second-class matter November 24, 1908, at the post office at Reno, Nevada, under the Act of Congress of March 3, 1879.

ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

When completed the Catalog may be had in neat green cloth binding for $1.50 postpaid. Orders for the cloth bound book may be sent in now, payment to be sent when the book is delivered.

A. A. Heller,

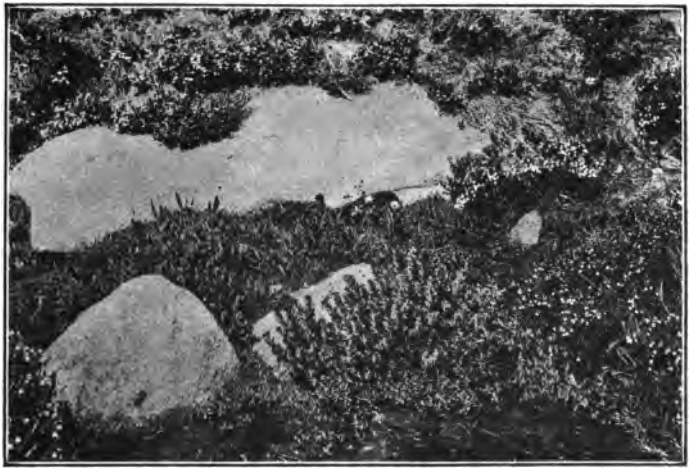
539 West 5th street, Reno, Nevada

Volume 8 Number 8

MUHLENBERGIA

AUGUST, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY



Rhodiola integrifolia Raf.

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University of Nevada,
Reno, Nevada

Volume 8 September 30, 1912

MUHLENBERGIA

THE NEVADA LUPINES—VII

By A. A. Heller

Lupinus rubens Rydb. Bull. Torr. Club 34: 45. 1907

Caulescent, branched from the base, about 1 dm. high, the branches tinged with red and more or less hirsute throughout except the glabrous upper surface of the leaflets: petioles 2 to 4 cm. long; stipules green or greenish, narrowly lanceolate, less than 3 mm. long, nearly basal; leaflets commonly 7, spatulate or oblanceolate, 15 mm. long, 5 mm. wide, the pubescence of the under side appressed: peduncles very short, about 1 cm.: inflorescence lax, about 1 dm. long, overtopping the leaves: bracts membranous, subulate, less than 3 mm. long, bearded wtih scattered stiff white hairs: pedicels slender, 4 mm. long: corollas violet-purple, 9 mm long, 7 mm. deep, space between apices of banner and wings 2 mm.: calyx more or less hirsute-ciliate, the upper lip 2 mm. long, sharply 2-toothed, broadly ovate, 2 mm.

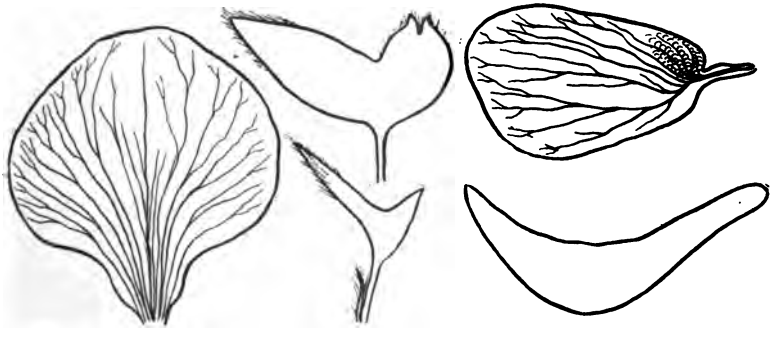


Figure 12. Floral parts of *Lupinus rubens*, enlarged

wide at base; lower lip 5 mm. long, 3 mm. wide at base, lanceolate, acute, entire: banner with a quadrate yellow spot on the

Plate 11

Lupinus rubens Rydb.

face, broadly obovate, 7 mm. wide when spread out, the sides turned back and probably parallel; wings apparently entirely covering the keel, 5 mm. deep; keel strongly curved.

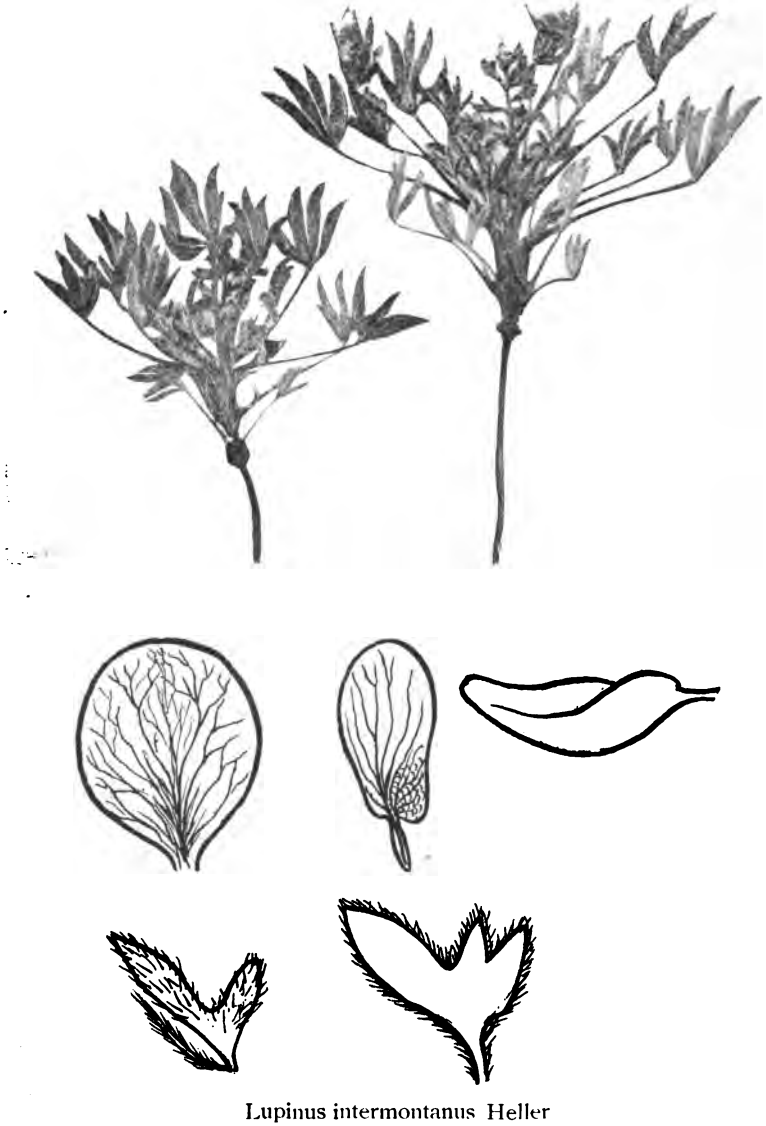
The description and illustrations are from *Parry 41*, collected near St. George, Utah, in 1874, the specimen in the herbarium of the Missouri Botanical Garden. This is part of the type collection. Dr. Rydberg compares this with *L. pusillus*, but the habit and aspect is different. A remarkable feature of this species is that the stipules are more nearly free than in any related species.

L. rubens has been collected at least once in Nevada, *Goodding 2234a* from Dry Lake, Clark county, distributed as *L. pusillus*, is this species. It is grouped with the subgenus *Platycarpos*. Since none of the Great Basin and interior species are strictly typical, I now propose a new section for them, which may bear the name PUSILLI, from the oldest species in the section. They have medium sized connate cotyledons with entire edges, scattered, usually violet flowers which are shaped much like those of typical Lupinus, the calyx lobes both green, the upper one usually well developed; pods ovate or elongated, and sometimes more than 2-seeded.

Lupinus intermontanus sp. nov.

About 1 dm. high, with an equal spread, or sometimes one and a half times the height, caulescent, the stem proper about 2 cm. long, the branches at first ascending, finally spreading, whole plant except the upper surface of the leaflets hirsute with spreading white hairs: petioles two or three times the length of the blade, with a prominent yellow midrib; leaflets usually 5, oblanceolate-oblong, rounded at the apex, 2cm. or less in length, up to 7 mm. wide, appressed hirsute beneath, glabrous above, margins ciliate: peduncles very short, rarely as much as 1 cm. long, the inflorescence up to 4 or 5 cm., but the whole shorter than the leaves: flowers bright violet-blue fading white or pinkish, 6 mm. long, 5 mm. deep, distance between apices of banner and wings about 2mm.: bracts membranous, oblong-lanceolate, 5 mm. long, over 1 mm. wide at base, bearded with long hirsute

Plate 12



Lupinus intermontanus Heller

hairs: pedicel barely 2 mm. long, glabrous: calyx tube nearly glabrous; lobes green, hirsute like the rest of the plant, the upper about 1.5mm. long, cleft to the base into lanceolate divisions; lower 3 mm. long, entire: banner with the edges turned back, appearing as if shorter than the wings, when spread out 6 mm. long, 5 mm. wide; wings moderately inflated, open and exposing the keel to a point a little above the lower calyx lobe: keel moderately curved: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9599*, collected at Wadsworth, Churchhill county, Nevada, May 7, 1909, growing in granite sand in open places in the sage brush.

This species has been distributed by me as *L. pusillus*, to which it is nearest related. Other collections from Nevada are *Shockley 270* from Candelaria, and *Watson 221* in part, from near Unionville. *Purpus 5802* from "sandy plains, Deep Spring Valley, Calif." also belongs here. It is apparently confined to western Nevada and southeastern California, although it may be found in southeastern Oregon.

Lupinus variegatus sp. nov.

Perennial (§ Calcarati): stems clustered from a thick woody rootstock, 4 or 5 dm. high, shortly appressed silky but not pale, unbranched, leafy: leaflets 9 to 11, oblong-oblanceolate or oblanceolate, 4 cm. long, 6mm. wide, acute and apiculate, or about 8 mm. wide and obtuse, light green and sparingly appressed pubescent above, paler and more densely pubescent beneath, or the broader obtuse forms silvery beneath, the pale midvein rather prominent; petioles of lower leaves up to 12 cm. long, those of the uppermost 2 cm. or less; stipules subulate, 6 or 7 mm. long, nearly free: peduncles short, 2 or 3cm. long: inflorescence rather dense, 1 dm. or less, the pedicels, calyx and bracts densely short hirsute: flowers yellow and purple, occasionally white and purple, or entirely yellow, spurred at base, the spur thick, barely 2 mm. long: bracts lanceolate, 6 mm. long, 1 mm. wide at base: pedicels rather stout, 5mm. long: upper calyx lip pale, 2-toothed the whole broadly ovate, 3 mm. long, 5 mm. wide at base; lower

lip broadly lanceolate, 4 mm. long, 3 mm. wide at base, entire or sometimes imperfectly 3-toothed; a bractlet 1 mm. long in the sinus between the lips: corollas 11 mm. long, 9 or 10 mm. deep, a space of 3 mm. between apices of banner and wings; banner a little longer than the wings, its edges turned back and parallel, about 6 mm. apart, back glabrous, face 3 mm. across, slightly

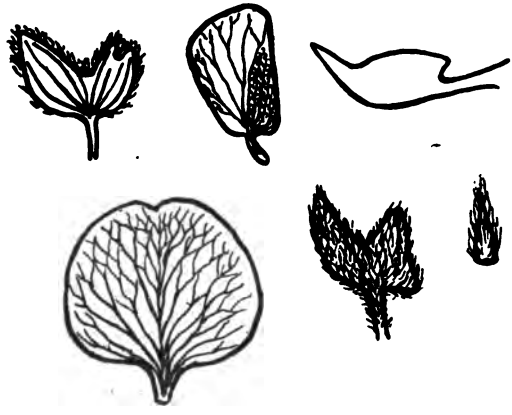


Figure 13. Floral parts of *Lupinus variegatus*, enlarged

flaring at the apex, the groove narrow; wings with a low inflation, 4 mm. wide and 4 mm. deep but 6 mm. deep when fully spread out, the upper edges raised into a sharp ridge, on either side of this a broad depression, lower edges closed, completely hiding the keel; keel glabrous, but little curved: pods 3.5 cm. long, 7 mm. wide, 5 or 6-seeded, somewhat villous with tangled white hairs: seeds light brown-red, smooth and shining, somewhat lenticular in appearance, 5 mm. long, 4 mm. wide at the rounded top, the base narrower.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10551*, collected July 8, 1912, on the Ruby mountains near Deeth, Elko county, Nevada, at an elevation of 7300 feet. The pods and seeds were obtained about a thousand feet lower, from plants which seemed to be identical but were past flowering.

The nearest relative of this species is *L. calcaratus* of western Nevada. The flowers seem to average larger than those of *calcaratus*, which are wholly white or purple tinged, are not so

broadly inflated, the banner is glabrous, more rounded in outline, the wings deeper, the keel less curved, and the calyx of different shape. The pubescence is practically the same. The flowers are sweet scented.

This species has an altitudinal range of about 1800 feet. The type was collected well toward the upper limit, which is at about 7500 feet. It inhabits open slopes, growing among the sage brush, and even where thickets of aspen and Amelanchier occur, is never found in them.

From about 7500 to 7900 feet was found a purple and white flowered form which does not seem to differ essentially in floral characters. The flowers were less fragrant, the keel slightly more exposed, and the whole plant more pubescent.

LUPINUS STENOPHYLLUS (Nutt.) Rydb. Bull. Torr. Club **34**: 42. 1907.

Lupinus foliosus var. *stenophyllus* Nutt.. T. & G. Fl. N. A. **1**: 377. 1840.

The type of this was collected on the "Oregon plains" by Nuttall, and is represented in several eastern herbaria by a piece of the top of a plant showing a rather lax one-sided flowering spike. The semi-spurred flowers have the face of the banner almost concealed by the wings, and have a rounded appearance. The leaves are few and narrow, scythe-shaped.

In the meadows about Deeth, Elko county, is found a lupine which Dr. Rydberg says matches closely the original plant. It agrees fairly well with several other specimens in the *stenophyllus* cover, but I am not certain that these are rightly placed. While the flower is of the same type, my specimens are corymbosely branched, with a rather dense inflorescence of somewhat whorled flowers. The leaves are more numerous, and while narrow and acute, do not have the same appearance. I am inclined to think that true *stenophyllus* will prove to be a northern plant of limited range, but without flowers from the type for dissection, shall refer my plant to it for the present. It is being distributed under number *10554*.

NEW SOUTHWESTERN FERNS

By Leslie N. Goodding

Southern Arizona is especially rich in ferns. Its arid and isolated ranges produce them in great variety and beauty. After collecting ferns from this section for several seasons and studying them with inadequate library and herbarium facilities, I decided to send my collections to Dr. Nelson, of the University of Wyoming, along with some notes and descriptions I had made. As a result I submit this paper.

Asplenium parvulum **grandidentatum** var. nov.

Rootstock short, sparingly clothed with black scales: stipes tufted, very short, 1 to 3 cm., cherry-black, shining, rather fragile; rachis similar: frond linear, 10 to 15 cm. long, 1 to 1.5 cm. wide, pinnate: pinnae 20 to 30 pairs, mostly opposite, ovate to oblong, prominently auricled above and occasionally below, deeply dentate around the entire margin, sessile: sori comparatively long, 5 to 8 on each pinna, oblique, opening toward the midvein midway between it and the margin.

Asplenium canyon, Mule mountains, Cochise county, Arizona, in deep protected canyons, August, 1911. No. *976*.

This certainly seems distinct from *A. parvulum*, but owing to the weakness of words to express what is evident to the eye, it is here left as a variety.

Asplenium rupium sp. nov.

Roots numerous, long filiform: rootstock short, ascending, covered with rather soft dark scales: stipes short, 1 to 3 cm., green to dark brown: frond elliptical, acuminate at both ends, 15 to 20 cm. long, 4 to 6 cm. wide, pinnate: pinnae 12 to 20 pairs, alternate, oblong, tapering slightly toward the apex, obtuse, broadest at the sessile base, the bases of adjoining pinnae more or less confluent, margins entire: sori linear, 5 to 10 mm. long, 8 to 16 on each pinna, oblique to the midvein and opening toward it: rachis sparingly clothed beneath with scales made up of numerous anastamosing veins; except for these and those of the stipe the plant glabrous throughout.

Asplenium canyon, Mule mountains, Cochise county, Arizona, in rocky protected canyons, no. *969*, August, 1911, and no. *67*, April, 1909.

Apparently an excellent species, found only in the one locality.

Cheilanthes sonorensis sp. nov.

Rootstock creeping, slender, 3 to 4 cm. long, clothed with brown, linear scales: stipes reddish-brown. 2 to 8 cm. long, together with the rachis covered with light brown linear-lanceolate scales: frond deltoid to ovate, quadri-pinnate, 3 to 5 cm. long, 2 to 3 cm. wide: pinnae opposite or alternate, lower deltoid, upper oblong-ovate, tripinnate, ultimate segments linear or cuneate, the entire rolled ends forming the indusia.

La Cienega, Sonora, Mexico, on brushy north slopes, no. *942*, July, 1911.

Notholaena cochisensis sp. nov.

Rootstocks short, very chaffy with long light brown crepe-like scales: stipes tufted, 3 to 5 cm. long, together with the rachises clothed when young with linear, much divided scales resembling tomentum, often becoming glabrate with age: frond linear in outline, 1.5 to 2.5 dm. long, rarely more than 1.5 cm. wide, pinnate: pinnae 20 to 40 pairs, alternate, nearly orbicular, with two or three sinuations to each pinna, the dorsal surface sparingly clothed with a white deciduous stellate pubescence, the ventral surface densely clothed with brown obtuse scales.

Montezuma canyon, Huachuca mountains, Cochise county, Arizona, on rocky limestone ridges, August, 1910, no. *373*.

This species has been passing for *N. sinuata* var., but it is so uniform in its growth and differs so widely from *N. sinuata* that it deserves specific rank. It is uniformly very narrow with small pinnae, in marked contrast to those of *N. sinuata*, and has the lower surface covered with obtuse scales, whereas *N. sinuata* has lanceolate, acute scales.

Notholaena hypoleuca sp. nov.

Rootstock short, clothed with shining reddish-black, linear, acute scales: stipes tufted, 2 to 5 cm. long, light brown, clothed with white powder and lanceolate, acute scales: fronds linear in outline, 10 to 15 cm. long, 1.5 to 2.5 cm. wide, bipinnate, dorsal surface sparingly clothed with white powder, the lower densely, but the powder largely hidden by linear-lanceolate brown scales: pinnae 10 to 15 pairs, alternate, oblong-lanceolate, pinnate: pinnules 4 to 6 pairs to each pinna, oblong, obtuse, broadest at the base: sori brown, continuous around the margins.

Slavonian canyon, Mule mountains, Cochise county, Arizona, on rocky slopes, August, 1911, no. *1004*.

This species is most closely related to *N. Grayi*, from which it differs in the very conspicuous scales on the under side of the frond and several other important features.

Pellaea truncata sp. nov.

Rootstock short, stout, clothed with dark, linear, acute, scarious margined scales: stipes 1 to 2 dm. long, rigid, dark brown and shining: fronds 1.5 to 2 dm. long, 7 to 12 cm. wide, ovate-acuminate to deltoid in outline, glabrous, blue-green, bipinnate: pinnae linear to oblong; pinnules 9 to 19 to each lower pinna and ranging to 3 and 1 at the apex of the rachis, truncate at the base and apex, oblong, 8 to 10 mm. long, 6 to 8 mm. wide, mucro short and scarcely margined; in the mature pinnule the edges rolled in to the midrib.

Mule mountains, Cochise county, Arizona, in dry rocky places, August, 1911, no *977*.

Related to *P. Wrightiana* and *P. ornithopus*, from the former of which it can readily be distinguished by its numerous, short pinnules, and from the latter by its absolutely constant bipinnate character, observed in abundant material.

ALPINE PLANTS—XI

By P. Beveridge Kennedy

Rhodiola integrifolia Raf. Atl. Journ. **1**: 146. 1832.

The illustration represents a typical scene from the alpine flora of the eastern Sierra Nevada mountains at 10000 feet elevation, below a perpetual snow bank which supplies an abundance of moisture. The white portions appearing like snow are granite boulders, over which the alpine heath, *Cassiope Mertensiana*, with its multitude of rose tinted flower bells sometimes creeps.

Figure 14. *Rhodiola integrifolia* Raf.

The central clump is *Rhodiola integrifolia*, distributed by us in 1905 as *Sedum roseum*. One is attracted to this plant by its deep reddish-purple flowers and fruits. The leaves also have a purple tinge. Its excellent coloring, together with its strong roots and rootstocks, should make it an excellent addition to our list of alpines for rockeries. We have specimens of it from Mt. Rose, and from the East Humboldt or Ruby mountains in eastern Nevada. The photograph was taken on Mt. Rose in August, 1912.

NEW COMBINATIONS—X.

By A. A. Heller

Alsinopsis gregaria
Arenaria gregaria Heller, Bull. S. Cal. Acad. **2**: 67. 1903.

Alsinopsis Howellii (Wats.)
Arenaria Howellii Wats. Proc. Am. Acad. **20**: 354. 1885.

Alsinopsis laricifolia (L.)
Arenaria laricifolia L. Sp. Pl. 424. 1753.

Alsinopsis macrocarpa (Pursh)
Arenaria macrocarpa Pursh, Fl. Am. Sept. **1**: 318. 1814.
Alsine macrocarpa Fenzl, Verbreit. Alsin. 18.

Alsinopsis occidentalis nom. nov.
Arenaria Nuttallii Pax, in Engler, Jahrb. **18**: 30. 1893; not *Alsinopsis Nuttallii* (T. & G.) Small, 1903.
Arenaria pungens Nutt.; T. & G. Fl. **1**: 179. 1838; not Clem. 1816.

Alsinopsis palustris (Kellogg)
Alsine palustris Kellogg, Proc. Cal. Acad. **3**: 61. 1863.
Arenaria palustris Wats. Bot. Cal. **1**: 70. 1876; not Gay, 1845.
Arenaria paludicola Robinson, Proc. Am. Acad. **29**: 298. 1894.

Alsinopsis pusilla (Wats.)
Arenaria pusilla Wats. Proc. Am. Acad. **17**: 367. 1882.

Alsinopsis tenella (Nutt.)
Arenaria tenella Nutt.; T. & G. Fl. N. A. **1**: 179. 1838.
Greniera tenella Gay, Ann. Sci. Nat. III. **4**: 27.
Alsine tenella Torr. U. S. Expl. Exped. **17**: 243. 1874.

Cheirinia ammophila
Erysimum ammophilum Heller, Muhlenbergia **1**: 51. 1904.

Cheirinia nevadensis
Erysimum nevadense Heller, Muhlenbergia **1**: 52. 1904.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 9

MUHLENBERGIA

SEPTEMBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Oxyria digyna (L.) Hill

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University of Nevada,
Reno, Nevada

Volume 8 October 31, 1912

MUHLENBERGIA

THE EUPHORBIAS OF TUCSON AND VICINITY

By J. C. Blumer

The genus *Euphorbia*, as represented in southern Arizona, is composed entirely of erect or creeping herbs. Strangely enough, this land of cactus possesses no fleshy forms resembling the cacti. For these we must go all the way to south Africa and western Asia. In our region it is one of the richest in species, and, unlike most genera, ranges all the way from the desert to the high mountains. The smaller and the prostrate herbs usually live at lower altitudes, the forms with very small leaves, as is the case in many other groups, being peculiar to the desert. Three species are perennial, and these are small plants belonging to the desert. Several others are summer annuals. All the coarser herbs of erect growth found at various elevations from 2500 to 8000 feet are annuals.

The thirty eight collections made by the writer without paying particular attention to this genus, represent probably twenty eight or twenty nine species. Of these, some nine or ten were found in the Chiricahua mountains; an undetermined one is from the Burro mountains of New Mexico; two more, yet undetermined, come from the vicinity of Nogales on the boundary; four are from the mountains immediately surrounding Tucson, and twelve species were collected in the summer of 1908 at Tucson itself. The different species are more or less closely limited to their own particular region. For instance, apparently none of the Tucson species are found in the Chiricahuas. This is not strange, if we consider the great difference in environment. But *E. dictyosperma* and *E. campestris* of the Rincon mountains, and *E. mollis* of the Santa Catalinas, are replaced in

the Chiricahuas by *E. crenulata*. They grow under very similar conditions in the same zone, and show the same biological form, yet they are apparently specifically distinct, indicating development along different lines. Among the Chiricahua species are *E. crenulata*, *E. dentata* and several related forms, *E. bilobata*, *E. exstipulata*, *E. stictospora* aud *E. serpens*. Of these only *E. bilobata* was recollected near Nogales, and of the Tucson species, *E. Preslii*. Nineteen numbers from Tucson and the surrounding mountains were sent in February, 1910, to Dr. C. F. Millspaugh, of the Field Museum, who very courteously made the determinations as herewith given.

EUPHORBIA VERSICOLOR Greene, Bot. Gaz **6**: 184. 1881.

Desert Laboratory, Tucson, Arizona, September 7, 1908, no. *2504*, Growiug near a recent earthdump, and also along the road to the laboratory. It is a small, prostrate, hairy annual, the flowers with a dark center and foliage of a handsome, reddish color. Its habitat and scarcity point to recent introduction.

EUPHORBIA SETILOBA Engelm. Pac. R. R. Rep. **5**: 364. 1857.

Tucson, September 19, 1908, no. *2505*. This hairy, creeping annual with minute leaves, resembles *E. versicolor*, but its corolla lobes are irregularly toothed. It is found on the sands of Tummamoc wash, where it is abundant, varying much in size, flowering plants often being very small.

EUPHORBIA ALBOMARGINATA T. & G. Pac. R. R. Rep. **2**: 174. 1855.

On the rich soil of the flood bottoms of the Santa Cruz river at Tucson, September 30, 1908, no. *2506*. Closely creeping, its long runners or branches often gracefully serpentine. The rather large corollas, and many of its leaves turning red at this season, together with its graceful habit, makes it an attractive plant. Also seen in the yard of St. Mary's hospital, and on Tummamoc wash.

EUPHORBIA PROSTRATA Ait. Hort. Kew. ed. 1, **2**: 139. 1789.

On the Santa Cruz river bottom at Tucson, September 25, 1908, no. *2507*. Creeping in dense mats on silted outwash,

under mesquite forest. The plants are pale and bluish beneath, and the flowers very small and inconspicuous.

EUPHORBIA PEDICULIFERA Engelm. Bot. Mex. Bound. 186. 1859.

Tummamoc wash at Tucson, September 19, 1908, no. *2508*. A trailing, deep rooted perennial of the sand banks. Both in form and the variegated coloring of its leaves it is a handsome plant, and is comparatively infrequent. As in *E. setiloba*, also found on the sand banks accumulated and sifted by floods, there is much variation in the size and strength of flowering plants. Undoubtedly this is due to the great variation in the size of the grains in contiguous bodies and layers of sand, and the distribution of moisture and temperature therein.

EUPHORBIA PYCNANTHEMA Engelm. Bot. Mex. Bound. 188. 1859.

At the machine shop of the Desert Laboratory, August 31, 1908, no. *2509*. This plant produces dense and often large mats in recently disturbed and trodden places. The leaves are elongated, and the fruit is rounded, with a purple line on the back of each capsule. In *E. prostrata*, the other densely matted plant of waste places, the leaves are round, and the fruits sharply triangular. The machine shop having been built this spring, the species was introduced then. A somewhat aberrant form was collected on Tummamoc hill, September 30, 1908, no. *2545*, and another at the machine shop on the same date, no. *2552a*.

EUPHORBIA NEO-MEXICANA Greene, Bull Cal. Acad. **2**: 56. 1886.

This little annnal bloomed and fruited in gravelly places of the Covillea footslope near St. Mary's hospital as early as the latter part of July, 1908, no. *2510*. At first confused with *E. glyptosperma* on account of its partly erect habit and same general phase of occurrence, it was soon found to be very distinct. It is a true summer annual, inhabiting the calcareous drift slope, while *E. glyptosperma* is a perennial of the residual slope just above, each remaining in its own habitat.

EUPHORBIA GLYPTOSPERMA Engelm. Bot. Mex. Bound. 187. 1859.

North slope near Desert Laboratory, August 31, 1908, no. *2511*. This is *E. capitellata* of Thornber's list, "Vegetative Groups of the Desert Laboratory Domain," in Spalding, Carnegie Institution Publication 113. This is easily the most abundant species about the Tumamoc hills, but well limited to the rocky, basaltic slopes of residual clay soil. While it is not certain that all individuals vegetate twice annually, the species certainly blooms both in winter and in summer, as do many other desert perennials. It has a semi-erect habit, recurved branches, and a perennial root. Typical leaves are trowel-shaped, that is, elongated, rounded at both ends, and slightly tapering toward the apex. Some variants with oblong-linear leaves were found, but these were only two or three in number and could not be separated on any other ground. Evidently it is one of those offshoots more or less definitely exceeding what is known as individual variation, yet by far too small to constitute specific variation. Such cases are frequently found in nature among abundantly represented species.

EUPHORBIA FLORIDA Engelm. Bot. Mex. Bound. 189. 1859.

Tumamoc hill, August 31, 1908, no. *2312*. This is a small, slender, erect summer annual, sparingly furnished with long, linear leaves. The flowers are large for the genus as here represented, the terminal ones nearly white, but the lower subaxillary ones are often of a deep rose color. When suffering for want of moisture the long leaves, ordinarily held in a horizontal or ascending position, become very limp and drop until they hang vertically. The species is well distributed on the stiff soil of the hill slopes with *E. glyptosperma*, but is nowhere abundant.

EUPHORBIA PRESLII Guss. Fl. Sic. Prod. **1**: 539. 1827.

Santa Cruz river bottoms, August 25, 1905, no. *2513*. An erect annual, one to two feet high, abundant in rich, well watered soil of the flood plain. The conspicuously serrate central leaves are much larger than the branch leaves.

EUPHORBIA HETEROPHYLLA L. Sp. Pl. 453. 1753.

On the edge of Santa Cruz bottom near an irrigation ditch, August 31, 1908, no. *2514*. This tall succulent annual is plentiful in certain rich places along the ditches at this season, reaching a height of two feet and more. The very large leaves possess an outline that is quite unique. Anatomy, habitat and season combine to characterize this plant as a monotype.

EUPHORBIA POLYCARPA HIRTELLA Boiss.

On Santa Cruz flood plains, Tucson, September 30, 1908, no. *2546*. On pastured flow land, where it creeps abundantly in mixture with *E. albomarginata*.

EUPHORBIA MOLLIS Engelm.

Santa Catalina mountains, July 8, 1909, no. *3176*. Between Oracle Ridge and the sawmill site, at an altitude of 7800 feet, in the zone of the pines. In flower and fruit. Probably annual.

EUPHORBIA CAMPESTRIS C. & S. Linnaea **5**: 84. 1830.

Rincon mountains at Manning camp, altitude 7900 feet, July 24, 1909, no. *3262*. A handsome annual of erect habit of the type of *E. crenulata*, but quite distinct.

EUPHORBIA DICTYOSPERMA F. & M. Ind. Sem. Hort. Petrop. **2**: 37. 1835.

Manning camp, Rincon mountains, altitude 8000 feet, September 20, 1909, no. *3383*. An annual similar to the preceding, growing in a moist canyon bottom. Best preserved behind a rocky point, which gives protection from the dry, destructive wind sweeping thru open parts of the canyon, where many plants have wilted and shrivelled.

EUPHORBIA MELANADENIA Torr. Pac. R. R. Rep. **4**: 135. 1857.

Base of Rincon mountains, upper end of Rincon valley, July 27, 1909, no. *3278*. This little lowly spreading or slightly raised perennial is very attractive because of the great abundance of its minute, silky gray-green leaves and the profusion of its flowers, whose dark centers contrast pleasingly with the white borders. It should be of value to gardeners as a border

plant. The first collection was made in the Tortillita mountains, September 10, 1908, no. *2583*, on open grassy soil near a cliff dwelling. It is one of the most characteristic plants of these granite mountains, so abundant in places that one can not walk without stepping upon it. These two numbers were determined by Dr. Millspaugh. Four other collections of what is undoubtedly the same species were made as follows: Santa Catalina mountains, July 9, 1909, no. *3157*, on an open south slope near the Basin at 4000 feet elevation, and March 16, 1911, no. *4262*, at the entrance to a rocky canyon near the Big Vein Copper Company, at the base of the mountain at 3000 feet. This elevation is that of the Tortillita station, and the soil is similar in all three cases. Baboquivari mountains, April 2, 1910, no. *3654*, near the top of a high ridge south of Coyote Indian village, on a south slope at about 5000 feet. Qui-itowoc hills, February 17, 1911, no. *4216*, on the north slope of a basaltic table mountain at about 2500 feet. Altho the writer has no notes in this particular case, it is quite probable that the species would have been looked for in vain both on the south side of this mountain, and on the north side of the ridge at the preceding station. This is explained in Plant World **14**: 236. 1911. As the dates indicate, it was collected in flower from February to September. While in common with many other perennials in this region of a double rainy season, it probably has two well marked flowering periods annually when the flowers are produced in greater profusion, it is one of the most constant bloomers to be found in the desert.

THE NORTH AMERICAN LUPINES—VIII.

By A. A. Heller

Lupinus apertus sp. nov.

Perennial: stems simple, several from a thick rootstock, 3 or 4 dm. high, leafy, pale or purplish, slightly pubescent below with short appressed hairs, more densely so above: leaflets 8, sometimes less, elliptical-oblanceolate, 4 cm. long or less, the largest 1 cm. wide, the rounded apex tipped with a short mucro, bright green, sericeous with very short appressed hairs which do not hide the green, scarcely paler beneath, but the pubescence denser, pale midvein rather prominent; petioles of largest leaves 2 cm. long; stipules free, subulate, about 1 cm. long: peduncles short, only 3 or 4cm. long: inflorescence 5 to 12cm. long, rather

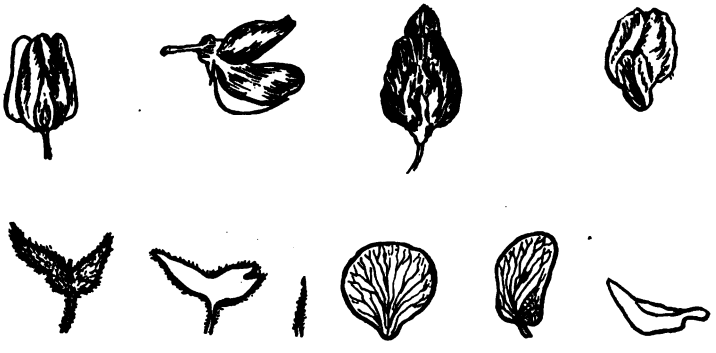

Figure 15. Flowers of *Lupinus apertus* slightly enlarged

lax, flowers whorled, equaling the internodes: pedicels slender, 4 or 5 mm. long: bracts subulate, caducous, a little shorter than the pedicel: upper calyx lip ovate, 4 mm. long, 3 mm. wide when spread out, entire or commonly 2-toothed, the sinus V shaped, 1.5 mm. deep; lower lip 6 mm. long, entire, lanceolate, 2 mm. wide at base when spread out; both lips very concave externally in nature; a bractlet 1 mm. long inserted below the sinus of the lips: corollas pale purplish, rich violet purple or whitish, 12 mm. long and as deep, distance between apices of banner and wings 7 mm.; sides of banner turned back and flaring somewhat in the lower half, the edges 4 mm. apart at the

apex, 7 mm. at the bottom, face somewhat purple mottled at base; wings 6 mm. deep, upper edges separated by an opening 1.5 mm. wide, the lower edges with an opening 4 mm. wide, exposing the keel, the width of the inflated wings 4 mm.; keel glabrous, strongly curved, 3mm. deep at the middle, the acute apex purplish: pods and seeds not seen.

The type, in the herbarium of A. A. Heller, is *Heller 6978*, collected July 20, 1903, at Summit, Placer county California, elevation 7000 feet. The type station is a few yards east of the hotel, where the Southern Pacific railroad crosses the Sierra Nevada. Specimens were distributed under the above name in 1903, but publication has been delayed until the relationship of the plant could be determined.

About two years ago Miss Eastwood informed me that it is related to *L. Andersonii*. Since that time I have examined the type of the latter and studied the living plant in the field. *L. apertus* has also been studied in the field on several occasions since 1903. Thousands of plants have been observed, for it is extremely plentiful in the woods below and west of Summit, growing in rich soil in the forest of *Abies Lowiana*, *A. magnifica*, *Pinus monticola* and *P. Murrayana* at 6800 to 7000 feet.

It is quite different in habit from the large, much branched *L. Andersonii* of the eastern side of the Sierras in Nevada, for it has simple stems, and also has slightly smaller flowers of more rounded outline, the parts of different shape, especially the keel, and more silvery, blunter leaves.

I would also refer here *Hall and Babcock 4508*, collected at Gold Lake, Sierra county, altitude 6400 feet, July, 1905.

LUPINUS LEUCOPSIS Agardh, Syn. 29. 1835.

Since Watson's treatment of the genus in Proc. Am. Acad. 8: 517-548. 1873, this name has passed as an unquestioned synonym of *L ornatus*. Agardh's description reads as follows:

"*L. leucopsis nob.* albido-sericeo-tomentosus; foliolis 7-9 lanceolatis petiolum aequantibus, stipulis subulatis brevibus, floribus in racemo densiori subverticillatis, bracteis caducissimis, calyce bracteolato, vexillo extus subsericeo, leguminibus tomentosis.

"HAB. In America Boreali-occidentali legit *Douglas.* Specimina misit Lindley.

"Caulis elatus, ramosus, pluripedalis, tomento densissimo albidus. Foliola 7-9, lanceolata, supra medium latiora, acuminato-mucronata, subcanaliculata, utrinque densissime sericeo-villosa, longitudine petioli. Stipulae supra medium adnata. Flores irregulariter verticillati, pedicellati. Bracteae. . . . Calyx bracteolatus, labio superiore bidentato, inferius integrum subaequante. Corollae coeruleae, L. perennis majores. Legumina tomentosa, 4 sperma."

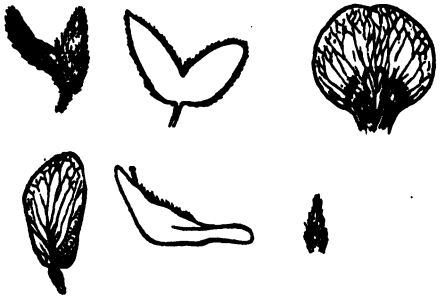

Figure 16. Floral parts of *Lupinus leucopsis*, enlarged

Agardh had seen a specimen of *L. ornatus* in the herbarium of Lindley, and indicates the relationship by placing it just before *L. leucopsis*. He indicates that *leucopsis* is more pubescent, has fewer leaflets lanceolate instead of obovate-linear, equaling the petiole instead of only half the length; shorter stipules; the racemes denser, imperfectly verticillate; the outside of the banner less pubescent, and the pods more pubescent.

Among specimens sent to Miss Eastwood for comparison with the types in England was my *10178*, collected along the river bank at Pendleton, Oregon, June 3, 1910. She reported that it is *L. leucopsis*, "but not a synonym."

Lupinus mollis sp. nov.

Perennial, soft white villous throughout except the flowers: stems several from a thick rootstock, 3 to 4 dm. high, leafy: leaflets 7 to 9, spatulate or oblong-oblanceolate, 4 cm. long, 8 mm. wide, the rounded apex with a short mucro, the pale mid-

rib rather prominent; petioles stout, 4 cm. long or less; stipules free, subulate, 5 mm. long: peduncles about 6 cm. long: inflorescence 10 to 15 cm. long, rather dense, the flowers in whorls, violet purple, the face of the banner pinkish, turning brown when dry: pedicels 5 mm. long: bracts lanceolate, acuminate, 5 mm. long, 1 mm. wide at base, caducous: upper calyx lip ovate when spread out, 4 mm. long and as wide at base, 2-toothed, the narrow V-shaped sinus 1 mm. deep; lower calyx lip lanceolate, entire, 6 mm. long, 3 mm. wide at base: corollas 1 cm. long, 8 mm. deep, distance between apices of banner and wings 2 mm.; banner rounded and gibbous at base, but hardly spurred, the sides turned back and somewhat inrolled, the short face with

Figure 17. Enlarged floral parts of *Lupinus mollis*.

a narrow groove, the apex on the dorsal side with a sort of keel, the whole broadly obovate, 1 cm. wide; wings inflated to about 5 mm., and 5 mm. deep, the upper edges almost meeting, a channel on either side, the lower edges apparently wholly inclosing the keel; keel glabrous, very strongly curved, 3 mm. deep at the middle: pods and seeds not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10080*, collected on grassy hills at the Dalles, Wasco county, Oregon, May 23, 1910.

This species is related to *L. nevadensis* Heller, Muhlenbergia **6**: 107, but has smaller flowers of a different shape though of the same type, rounded in outline, the banner and wings close together, the face of the banner turning brown in drying. It would be classed among the Saxosi according to pubescence in Piper's Flora of Washington.

While the grouping of the lupines into sections in Piper's Flora of Washington is excellent as a whole and an advance in the right direction, the dependence placed upon pubescence is a serious defect. *L. mollis*, described in this paper, should belong to the Saxosi, so far as pubescence is concerned, yet I am convinced its flowers are not at all like those of *L. saxosus*. I have in mind an apparently undescribed plant related by floral characters to *L. mollis*, but with a sericeous pubescence. While in some groups the pubescence may be fairly uniform, we must, as a rule, look for stronger characters. These may be found in the flowers. The seeds are often distinctive, but can not be depended upon, as they may vary considerably in a group, and again may be practically similar in several distinct groups. A lupine specimen in fruit only is not specially desirable, unless a flowering one can be obtained from the same place, provided its identity is uncertain.

The chief trouble with the lupines is not that they are so extremely difficult to place, but that they have neither been properly studied nor well described. Most lupine species are local in distribution, but an attempt has been made to read into them related species occupying other areas, or even species not very closely related. Most descriptions show that the flowers have not been dissected, or if they were, the characters not described. Even in dried unsoaked examples the difference between a flower having banner and wings pressed together with little space between their apices, and one having the banner reflected well away from the wings is easily noted. Yet mention of just such characters is almost unknown.

Lupinus yukonensis Greene, Leaflets **2**: 233. Oct. 22, 1912, is evidently a synonym of *L. borealis* Heller, Muhlenbergia **8**: 82. Aug. 10, 1912. While Dr. Greene does not cite the collection number, it is evident from the date and place that both names are based upon the same plant.

ALPINE PLANTS—XII

By P. Beveridge Kennedy

Alpine Sorrel

Oxyria digyna (L.) Hill, Hort. Kew. 158. 1768.

Rumex digynus L. Sp. Pl. 337. 1753.

Oxyria digyna Camptdera, Rumex 155. *pl. 3. f. 3.* 1819.

Oxyria reniformis Hook. Fl. Scot. 111. 1821.

Our illustration represents one of the few plants that are found growing indigenously in both the eastern and western hemispheres. It is found on all the great mountain ranges of Europe and Asia. On the North American continent it ranges from Greenland, Labrador and the high mountains of the New England States to Alaska, thence south through the Rocky mountains and the Cascade and Sierra Nevada ranges. It also occurs on the high peaks of the Great Basin region.

Figure 18. Oxyria digyna (L.) Hill

The thick and long roots penetrate deeply among the crevices of the lava rocks, indicating its excellent qualifications for rockery purposes. The bright red fruits contrasting with the green leaves make it an exceedingly ornamental plant. The photograph was taken on Mt. Rose, Washoe county, Nevada, in August, 1912, at an elevation of about 10000 feet.

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Volume 8 Number 10

MUHLENBERGIA

OCTOBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Castilleja inconspicua Nelson and Kennedy

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University of Nevada,
Reno, Nevada

Volume 8 December 7, 1912

MUHLENBERGIA

THE NORTH AMERICAN LUPINES—IX.

By A. A. Heller

Albifrondes

Shrubs, rarely herbaceous perennials, with a silky or sericeous pubescence: the petioles but little longer than the blades: calyx densely silky, bracteolate: corollas some shade of violet, large, 1 cm. or more long, and nearly as deep, the face of the banner standing well away from the wings, often white or yellowish, edges turned back, but usually separated by a space 4 or 5 mm. wide, especially at the base. Pacific coast plants, inhabiting open slopes and roadside banks at low or medium elevations; never strictly silvan.

The species of this group, as many as were described at the time, were included under Agardh's tribe Paniculati. But since the Peruvian *L. paniculatus* is not known to me, and since he also included certain of our species which do not belong in the group, as here limited, I have not adopted Agardh's name.

L. albifrons Benth.; Lindl. Bot. Reg. **19**: *pl. 1642.* 1833.

This species as at present understood is probably an aggregate. At least two forms are found in the bay region of California. One has a distinct woody trunk rising several feet above the ground, while the other is made up of many slender decumbent woody branches, from which the seasonal growth arises, the whole plant rarely taller than the trunk of the first form. Agardh, in his Synopsis, and Bentham in Trans. Hort. Soc. II. **1**: 410. 1835, describe the stem as decumbent. The exact type station is not known, but the plant is probably restricted to middle California.

LUPINUS DOUGLASII Agardh, Syn. 34. 1835.

This is readily distinguished by its narrow, practically linear leaflets. My *6590*, collected on the Carmel river in 1903, distributed as *L. albifrons*, is typical. One of the specimens with an unopened flower cluster shows subulate bracts longer than the calyx. Carmel may well be the type locality, as Monterey, only a few miles distant, was the headquarters of Douglas while in California. The species ranges from Monterey to the Santa Ynez mountains back of Santa Barbara.

LUPINUS FALLAX Greene, Erythea **2**: 119. 1894.

A shrub, so far found only on Mt. Tamalpais, near San Francisco. It too has very long bracts, but much broader leaves than *L. Douglasii.*

LUPINUS EMINENS Greene, Erythea **1**: 125. 1893.

This differs from *fallax* in having flowers scarcely whorled banner shorter than the wings, glabrous keel, and shorter and fewer seeded nearly erect instead of spreading pods, the pubescence more spreading.

LUPINUS BRITTONI Abrams, Bull. N. Y. Bot. Gard. **6**: 391. 1910.

This species, known only from San Diego county, California, is distinquished by the very short appressed pubescence, appearing glaucescent rather than silky. Like *eminens*, the flowers are not distinctly whorled. The seeds are small for the group, light tan with darker spots.

LUPINUS JUCUNDUS Greene, Manual 106. 1894.

Known so far only from Solano county, California, the type grown at Berkely from seed obtained in Gate's canyon.

LUPINUS LONGIFOLIUS Abrams, Fl. Los Angeles 209. 1904.

Probably not the plant that Watson named as variety *longifolius* of *L. Chamissonis*, and which, like most varieties, is so poorly characterized, that determination is impossible. This is a more inland plant than *Chamissonis*, has a different pubescence, a loosely flowered inflorescence, upper calyx lip more cleft, the white face of the banner changing to rose-purple instead of remaining yellow, and the keel ciliate. It ranges from Los Angeles county south to San Diego.

LUPINUS CHAMISSONIS Esch. Mem. Acad. Petersb. **10**: 288 1826.

A sand dune species common about San Francisco, where it was first collected. I have seen it as far north as Bodega bay in Sonoma county, and it is said to extend as far south as Orange county. Common on the dunes beyond Del Monte and to Monterey, it is strangely absent about Pacific Grove and from Point Pinos. Some of the leaves turn fuscous with age. The face of the banner retains the yellow spot, and the keel is glabrous.

LUPINUS COLLINUS (Greene) Heller, Muhlenbergia **2**: 292. 1907.

This differs from all the other Californian members of the group in having herbaceous stems and no woody trunk, merely a thick rootstock which sometimes develops short creeping woody stems. It has smaller and narrower leaves than *L. albifrons*, with which it was first associated as a variety, and the keel is glabrous instead of ciliate. The typical plant is found only on the hills about San Francisco, but I have provisionally referred to it a plant from Mt. Hamilton and neighboring ridges.

Lupinus acutilobus sp. nov.

A shrub (§ Albifrondes) about a meter high: herbaceous branches including the inflorescence about 3 dm. long, silky sericeous, as are the leaves, pedicels and calyx, very leafy: petioles little longer than the leaflets, these 7 to 9 in number, oblong or oblong-spatulate, the larger ones of the middle part of the stem 3 cm. long, 6 mm. wide, some of the upper and lower little more than half that length but nearly as wide; clusters of smaller leaves in the axils; stipules narrowly lanceolate, acuminate, 6 or 7 mm. long, nearly free, or the lowermost 1 cm. long, half free: peduncles rather stout, 3 to 8 cm. long: inflorescence about 1 dm. long, the flowers whorled, equaling the internodes: pedicels stout, 5 or 6 mm. long: bracts lanceolate-acuminate, 6 mm. long, 2 mm. wide at base: upper calyx lip 6 mm. long, nearly 5 mm. wide when spread out, parted to the middle, the sinus broadly V-shaped, the acuminate apices slightly divergent; lower lip nearly 8 mm. long, 3 mm. wide at base, 1.5 mm. at the 3-toothed apex; a bractlet 3 mm. long inserted a little below the

sinus: corollas deep violet-purple, large, 15 mm. long, 13 mm. deep, a space 7 mm. wide between apices of banner and wings; banner darker than the wings when dry, its face 7 mm. long, rather narrow, edges turned back and apparently nearly meeting, the back glabrous, the whole almost orbicular when spread out, 13 mm. wide; wings moderately inflated, probably not more than 6 mm., but very broad, 9 mm. deep and broadly rounded toward the apex, completely inclosing the keel on the lower side; keel glabrous, rather strongly curved but not rectangular, 4 mm. deep at the middle, the acuminate purple apex slightly protruding from the apex of the wings in the mature flower: ovary densely white silky.

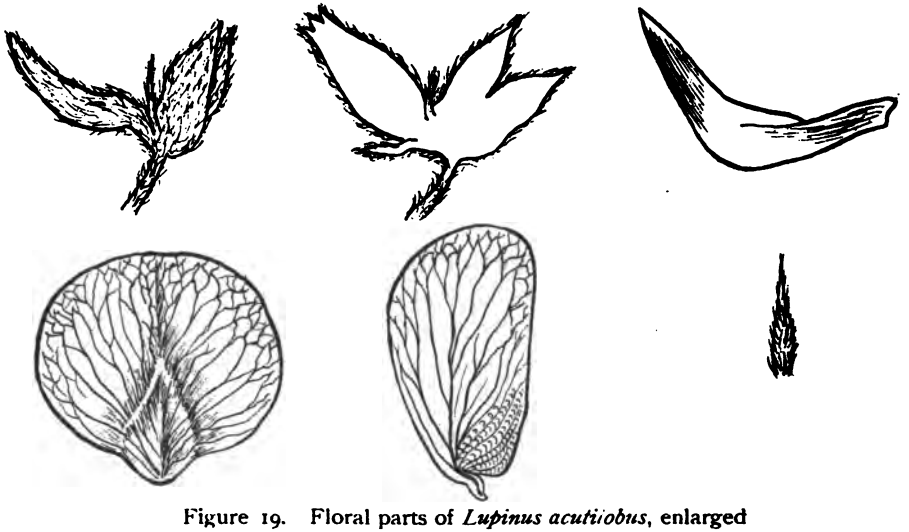

Figure 19. Floral parts of *Lupinus acutilobus*, enlarged

The type, in the herbarium of A. A. Heller, is an unnumbered specimen collected by myself on the rocky slope of East Butte, Marysville Buttes, in the Sacramento valley, California, May 16, 1902.

In leaf shape this handsome, very large flowered species is more related to *L. fallax* and *eminens* than it is to *albifrons*, but seems quite distinct. The smaller and fascicled leaves are beautifully fuscous, just as they are in *L. Chamissonis*, which it resembles in no other particular.

My *7849*, collected near Redding, Shasta county, and *5501*, collected in Berry canyon between Oroville and Chico, Butte county, are probably referable to this species, but they have somewhat smaller flowers, and the leaves of *5501* are shorter and broader in proportion.

Lupinus fissicalyx sp. nov.

Perennial (§ Albifrondes): stems several from a thick caudex, 5 or 6 dm. high, sericeous, as is the whole plant, especially the leaves and calyx, leafy: petioles of the middle part of the stem about 4 cm. long, the upper and lower somewhat shorter;

Figure 20. Floral parts of *Lupinus fissicalyx*, enlarged

leaflets 7 to 9, oblanceolate or spatulate, 3 cm. long, 8mm. wide, the rounded apex with a short mucro; stipules subulate, 5 or 6 mm. long, nearly free, only the lowermost 1 cm. long with the upper third free: peduncles 4 or 5cm. long: inflorescence 2.5dm. or less, the flowers verticillate, equaling or somewhat exceeding the internodes: pedicels rather slender, 7 mm. long: bracts very caducous, subulate, 5mm. long, 1mm. wide at base: upper calyx lip 6 mm. long, 4 mm. wide when spread out, cleft for 4 mm., the sinus narrow, lobes acuminate; lower lip 7 mm. long, lanceolate, entire, 3 mm. wide; a subulate bractlet 1.5 mm. long in the sinus: corollas pale violet-purple, 12 mm. long and as deep,

a space 4 mm. wide between apices of banner and wings; face of the banner yellowish, 5 mm. long, deeply channeled, edges turned back, somewhat flaring at base where they are about 7 mm. apart, 3 mm. at the apex; wings narrowly inflated, 3 mm., the upper edges closed, the lower open for nearly the whole length, exposing the keel, width 6mm. when spread out, broadly rounded from the middle to the apex; keel strongly curved, glabrous, 3 mm. deep at the middle, the acuminate apex purple.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10025*, collected May 16, 1910, at Grant's Pass, Josephine county, Oregon. It is not closely related to any of the other Albifrondes, no part of the stem being at all woody. However, I have decided to admit it to the group on account of its agreement in pubescence, form of flower and leaf shape.

Lupinus amabilis sp. nov.

Perennial: stems several from a woody caudex, about 5dm. high, purplish and rather smooth looking, but appressed pubescent under a lens, moderately leafy: lower petioles long, 15 to 17 cm., the upper about half that length; leaflets about 9, oblong, attenuate at base, narrowed and cuspidate at apex, 5 cm. long, 5 mm. wide, yellow-green and glabrous above, dull green and appressed pubescent beneath; stipules lanceolate-acuminate, the lowermost 15 mm. long, free for half their length, the uppermost 5 mm. long, nearly free: pednncle 5 or 6 cm. long: inflorescence 1.5 to 3 dm. long: flowers verticillate, equaling the internodes, rich violet purple: pedicels 5 or 6mm. long, slender, silky sericeous, as is also the calyx: bracts ovate, acuminate, 4 mm. long, 2.5 mm. wide: upper calyx lip 2 mm. long, rounded when spread out, shallowly notched; lower lip 5mm. long, ovate, acute, entire, with a prominent midvein; bractlet in the sinus a small rounded appendage terminating a rib which extends up from the base of the calyx: corollas 9 mm. long, 6 mm. deep, gibbous at base but hardly spurred, a space of 2 mm. between apices of banner and wings; face of banner 3 mm. long, rather broad with a broad deep groove, edges somewhat turned back, flaring at base;

wings inflated 3 mm., two-thirds of their length covered by the banner, 3 mm. deep, the lower edges united only at the apex but meeting and concealing the keel except for a small space above the calyx; keel glabrous, broad for the flower, 3mm. deep, the width well sustained toward the acute purple apex.

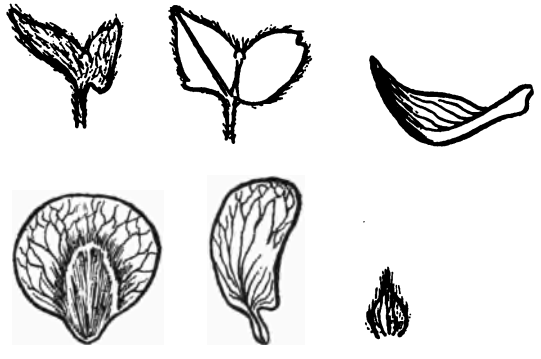

Figure 21. Flowers of *Lupinus amabilis*, enlarged

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10043*, collected May 18, 1910, at Eugene, Lane county, Oregon, where it was abundant in clayey soil on the railway embankment south of the town.

The relationship of this beautiful species is uncertain, but it should probably be referred to the group of which *L. laxiflorus* may be taken as the type. Geographically it has better claims to the name *stenophyllus* than my *10554* and other plants referred by Dr. Rydberg to that species, but differs so much in general appearance from Nuttall's type that I can not well consider it identical.

The structure of the calyx is the most peculiar so far observed, on account of the insertion of the bractlet and the keel or midvein showing so prominently on the interior of the lower lip.

Lupinus obtusilobus sp. nov.

Perennial, silky sericeous throughout: stems in clumps from short rootstocks, 2 dm. high, leafy: petioles about the length of the leaflets; leaflets 5 to 7, elliptical-oblong, 3 cm. long, 6 mm. or less wide, the acutish apex with a short mucro; stipules sub-

ulate, free, 4 mm. long, very silky villous: peduncles 3 cm. long: inflorescence about 5 cm. long, the flowers verticillate, dense: pedicels rather stout, 3 mm. long: bracts lanceolate, acuminate, 6 mm. long, 1.5 mm. wide: upper calyx lip 5 mm. long, 4 mm. wide when spread out, broadly notched, the lobes rounded; lower lip 6mm. long, 3mm. wide, 3-toothed; a subulate bractlet 1mm.

Figure 22. Floral parts of *Lupinus obtusilobus*, enlarged.

long in the sinus: corollas violet-purple, 1cm. long and as deep, a space 4 mm. wide between apices of banner and wings; banner broader than long when spread out, the face 5 mm. long, deeply grooved, edges apparently but little turned back; wings moderately inflated, exposing the keel for a short distance only, the lower edges well rounded, 7 mm. deep at the middle; keel moderately curved, 4 mm. deep, somewhat ciliate throughout, the acuminate apex purple.

The type, in the herbarium of A. A. Heller, is *George B. Grant 730*, collected on Mt. Shasta, California, at an altitude of 8000 feet, September, 1902, distributed as "*Lupinus ornatus* Auct." It bears but little resemblance to *L. ornatus* of eastern Washington and northern Idaho. It was also collected on Mt. Shasta, August 15, 1903, by *Copeland*, distributed by C. F. Baker under no. *3918* as "*Lupinus Andersonii* Gray," a species local in the mountains of western Nevada, and not as yet detected in California.

FIVE DWARF LUPINES

By Edward L. Greene

Lupinus fruticulosus

Low diffuse undershrub, either fastigiately branched from the base and 6 or 7 inches high, or more depressed and matted, the mat 6 to 10 inches across: leaves many, small, but on long slender petioles; leaflets 5 to 7, rather broadly oblanceolate, acute, the largest only ⅔ inch long, the pubescence of both faces rather short, silky, appressed, not so dense as to conceal the green of the foliage altogether: racemes short, of 5 or 6 crowded verticils, but borne above the foliage on very slender peduncles: corolla purple, the petals not unequal, the banner broad and upright; keel with a margin of short dense implexed white wool: pod short, silky, 1 to 3-seeded.

Apparently common in Klamath county, southern Oregon, where it was gathered in the matted state by *Coville and Applegate*, 31 July, 1897, and in the more upright typical form by *Mrs. R. M. Austin*, 9 August, also 1897. All give Annie Creek Valley as the special habitat of this, which must be a handsome species.

Lupinus perditorum

Of the size of the last, the parts as slender, much more loosely or not at all matted: leaflets ½ inch long, oblong rather than oblanceolate, the pubescence more scanty and less appressed: racemes narrow, more elongated, the small deep purple flowers not in verticils: banner short, smaller than the very broad and conspicuous wings; keel rather narrow and subfalcate, shortly woolly-margined.

In dry openings in woods along Rogue river, Jackson county, Oregon, 8 July, 1898, *E. I. Applegate;* type on U. S. Herbarium sheet *361817*.

Lupinus abortivus

Dwarf perennial, the very numerous branches densely tufted on the shortly branched crown of a cylindrical taproot, but all apparently suberect rather than at all depressed, 6 inches

high, rather slender, all herbage clothed with a rather coarse but soft villous and appressed coat, this brownish: petioles very long and slender; leaflets about 7, oblanceolate, acute, very unequal, ¼ to ¾ inch long: racemes peduncled yet hardly borne above the foliage: corolla apparently light blue-purple; petals very unequal, banner greatly reduced, of barely two-thirds the length of the wings and hardly spreading away from them; the short keel closely woolly ciliate.

This is another of Mr. Leiberg's choice gatherings of 1896, made in a remote part of southeastern Oregon; this one from near Stinking Water, 21 June. The name I have assigned this new species is not appropriate except as relating to the reduced banner petal. The plant is copiously floriferous and must be rather beautiful among the dwarfs of the genus. The type specimen is on U. S. Herbarium sheet *275613*.

Lupinus volutans

Stout depressed dwarf perennial, all the herbage rough with a subfuscous hirsute pubescence, a dense short tomentum underlying the shaggy coat: all the short thick branches densely leafy with a long-petioled foliage, the largest of the 5 to 7 leaflets 1 inch long, rather broad, subcuneate-elliptic, obtusish: racemes short, compact, only in part surpassing the foliage, the rachis and calyx densely villous hirsute and fuscous: corolla small, light purple: banner rather narrow and hardly erect; keel short, not falcate, the margin densely white woolly from below the middle to the apex.

Malheur Valley, in arid southeastern Oregon, collected 8 June, 1896, by J. B. Leiberg, and not otherwise known; type on U. S. Herbarium sheet *276551*. It appears to have grown in dry clayey or alkaline soil, and the dust of this adheres to all the basal parts of the plant, as if it had wallowed in it, hence the specific name.

Lupinus crassulus

Plant stout and low, the flowering branches stout, herbaceous and somewhat fleshy, resting on a thick tough but somewhat ligneous partly subterrenean caudex, suberect, very leafy,

the short racemes many, borne hardly above the foliage: petioles stoutish, much longer than the leaves and loosely villous hirsute; leaflets about 7, unequal, very broad, cuneate-oblong, the longest about ½ inch long, almost hoarily villous hirsute, most so beneath: racemes peduncled, but the peduncles not quite equaling the foliage: flowers small and crowded, yet apparently verticillate; petals equal, in the main deep blue, the whole middle of the banner at first deep yellow, changing to deep blue; keel broad, not falcate, somewhat bristly ciliate, the hairs not closely approximate, but of a length very unusual: pod and seeds not seen.

Collected 5 August, 1912, at an altitude of 10500 feet in the Stanislaus forest reservation, California, by *J. H. Hatton;* evidently a subalpine and partly shrubby lupine, yet in aspect and character most unlike the other suffrutescent species of the high Sierra, its stoutness and fleshiness suggesting some of the coarser annual species of the Coast Range and seaboard, yet a thorough perennial, and even suffrutescent.

ALPINE PLANTS—XIII

By P. Beveridge Kennedy

Alpine Painted Cup

Castilleja inconspicua Nelson and Kennedy, Proc. Biol. Soc. Wash. **19**: 38. 1906.

The inconspicuous flowered Castillejas now form a considerable group, some of which were originally placed in the genus Orthocarpus, while others, such as *Castilleja Lemmoni*, were treated as Castillejas. They seem without doubt to be a connecting link between the two genera. All are perennials with strong tap roots, from which come out numerous short stems from two to eight inches in length. The leaves are divided and subdivided into linear lobes.

Our illustration represents *C. inconspicua.* This species has been found only on Mt. Rose, Washoe county, Nevada, where it is common from 9000 to 10000 feet elevation, but is found more sparingly even on the summit, at 10800 feet. It is found in both the granite and volcanic formation. As in most of the species of Castilleja it is variable in coloring, but the prevailing hues are a mixture of cream and purple, with a very prominent deep purple spot, the stigma, appearing when young like an eye.

Figure 23. Castilleja inconspicua Nelson and Kennedy

The high mountain species of the Sierras proper seems to be *C. ambigua* Jones. *C. lapidicola* Heller, from the Ruby or East Humboldt mountains, Nevada, resembles *C. inconspicua* in general habit and appearance, but has a very different floral structure. The following species no doubt also belong to this group: *C. puberula* Rydb.; *C. rubida* Piper; *C. pilifera* A. Nelson; *C. villosa* Rydb.; *C. pilosa* (Wats.) Rydb.; *C. nana* Eastw.; *C. pallescens* (Gray) Greenm.; *C. longispica* A. Nelson; *C. Lemmoni* Gray; *C. arachnoidea*, *C. oresbia* and *C. schizotricha* Greenm.; *C. pratensis* Heller; *C. brachyantha* Rydb.; *C. Covilleana* Henderson.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 164 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 164 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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Volume 8 Number 11

MUHLENBERGIA

NOVEMBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Fruiting branch of Abies Lowiana

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University of Nevada,
Reno, Nevada

Volume 8 December 27, 1912

MUHLENBERGIA

THE CALIFORNIA WHITE FIR

By A. A. Heller

Abies Lowiana Murray, Syn. Var. Conif. 27. 1850.

This fir is commonly included under *Abies concolor*, and may not be distinct. Sudworth, in Forest Trees of the Pacific Slope 117, says: "The long maintained *Abies lowiana* Murray (cultivated in England, where it was first described), the *Abies concolor lowiana* of American authors, is a form of the white fir distinguished mainly by the length of its leaves."

Britton, in North American Trees 79, notes that "Low's fir, *Abies Lowiana* A. Murray, which occurs in the region of Mt. Shasta and southward in California, is considered by some a distinct species; its leaves are darker green and the cones chestnut brown."

Lemmon, in Third Biennial Report of the California State Board of Forestry 148-149, maintains *A. Lowiana* as distinct, but offers very little in the way of proof except that *concolor* has paler leaves. On page 138 he puts *Lowiana* under "leaves twisted at base," and *concolor* under "leaves not twisted at base." If this held good it should have considerable weight, but a specimen now before me, collected in the Mogollon mountains, New Mexico, exidently from a young tree, or at least a lower branch, has a slight twist to the leaves. The leaves on the lower branches, especially of young trees of *A. Lowiana*, are much less twisted than are those on the old fruiting branches of the upper part of the tree. The leaves of the New Mexican tree are much paler than are those of our Nevadan trees, are thinner, more pointed, flat on both sides, with indistinct lines or channels. Leaves from the lower branches of trees near Reno are

bright green, thick, distinctly channeled above, ridged beneath, with a channel on each side of the ridge, the apex commonly blunt and rounded.

Some two years ago when the question of identifying our white fir came up, I was much confused by the varying descriptions of *A. concolor*, but finally decided that it must be that species, but not agreeing altogether with any of the descriptions.

In Sargent's Manual the leaves of *A. concolor* are described as follows: "On lower branches flat, straight, rounded, acute or acuminate at the apex. . on fertile branches and on old trees frequently thick, keeled above, usually falcate, acute, or rarely notched at the apex."

Sudworth, in Forest Trees of the Pacific Slope 116, says: "Young foliage of the year is yellow-green, with a bluish cast, but later it turns to a pale yellow-green, with a whitish tinge. The leaves are flat, straight, and full and plump on the upper side, blunt or pointed—usually not prickly, but sometimes prickly on the lower crown branches of old trees. They stand out distinctly from the two sides of the lower branches by the twist in their bases; but very commonly the lower branches of young trees have their leaves curved and standing erect, somewhat in two lines, from the upper sides of the twigs. Leaves of the upper crown, especially on the topmost branches, are strongly curved or sickle-shaped, and appear to grow from the upper sides of the branchlets. These leaves and those on leaders are sharp-pointed. Lower branch leaves are usually longer (1 and a third to 3 inches long) than those of the upper branches, which are commonly about 1 to 1 and a third inches long. There is very great variation in the length, form, and thickness of leaves of this fir in different parts of its wide range. The changes in form from horizontally flattened leaves to vertically flattened ones, or to those resembling a sickle-blade, are curious; they are unexplained, except perhaps by the fact that the latter form is best adapted to the dry climate in which it most often occurs. Some authors hold that Rocky Mountain trees bear longer leaves, and more commonly pointed ones, than do trees of the Pacific forests. The writer has seen trees in the latter region

with quite as long leaves, while long blunt leaves are not infrequent on trees of the eastern range."

In this connection it may be noted that last summer young trees were found near Franktown, Nevada, at at altitude of 5600 feet having leaves horizontally spreading, while scattered among them were other trees of the same age, growing under identical conditions, but having their leaves upcurved.

Britton describes the leaves as "flat, linear, 3 to 6 cm. long, pale bluish green, often with a bloom when young, dull green with age, slightly channeled above, rounded or slightly notched at the apex on the lower branches, shorter, thicker, erect and curved on the upper fertile branches."

The cones are variously described as yellow, green, purple, or brown. With us they are light brown when fully mature, at least the long-persisting ones sometimes found late in November on young trees about thirty-five years old. These are usually not more than two inches long, about half the size of cones from mature trees. Full grown fresh cones have a greenish tint, due to the coloring of the dense puberulence amounting almost to down, on the apophyse or small exposed portion of the end of each cone scale. This apparently changes to brown with age on the tree, or may be brown from the beginning in some cases. Both sides of the scale, especially near the base, are more or less arachnoid pubescent.

Since the description given by Jepson in Silva of California 119, is no doubt drawn wholly from Californian material, I give it in full as it is appropriate for our western tree whether it be called *Abies Lowiana* or *Abies concolor*.

"Forest tree 60 to 150 or 200 feet high, with a narrow crown composed of flat sprays and a trunk naked for one-third to one-half its height and 1 to 6 feet in diameter; bark smooth, silvery or whitish in young trees, becoming thick and heavily fissured into rounded ridges on old trunks and gray or drab-brown in color, in section showing dull brown areas seperated by a coarse light-colored mesh; leaves 2 to 2½ (commonly 1 to 1½) inches long, flat, often with a median channel on upper side, or on the uppermost branches keeled, a prominent midrib beneath with a

Plate 13

Abies Lowiana. Mature trunk, mountains north of Verdi, Nevada

Plate 14

Abies Lowiana. Mature tree west of Hunter creek near Reno, Nevada

broad depressed stomatal band on either side, contracted at base into a very short petiole, acutish, obtuse or slightly notched at summit, spreading in 2 ranks or more or less erect by a twist in the very short petiole; staminate catkins cylindric, straw-yellow or red, ½ inch long or less; cones brown, oblong, rounded at summit and base, 2 to 5½ inches long, 1 to 1¾ inches in diameter; scales broad and rounded; bracts about ½ as long as the

Figure 24. Abies Lowiana. Young trees near Verdi, Nevada

scales, rounded and finely toothed, often with a notch at the top and usually terminating in a short slender point; seed 5 lines long, its wing 6 or 7 lines long, 5 or 6 lines wide, widening toward the truncate apex."

Not having had an opportunity to study the eastern tree, true *Abies concolor*, the original of which came from the mountains of New Mexico, I shall use the name *Abies Lowiana* for our western one. On geographical grounds alone one should

expect the western tree to be distinct. True *A. concolor* ranges from Utah and southern Colorado through New Mexico and Arizona into northern Mexico. *A. Lowiana* ranges from the Cascades of middle Oregon to northern Lower California. There is no connecting link through Washington, Idaho and Montana, as is the case in all the other conifers common to both the Pacific slope and the Rocky mountain region.

The tree is common in western Nevada, scattered individuals occurring as low as 5000 feet, which is about the lower limit also of the yellow pines. At about 5500 feet it becomes more frequent, and from 6000 to 7500 feet is abundant, often being the predominant tree. With us its upper limit is about 8000

Figure 25. Abies Lowiana. Mature tree near Verdi, Nevada

feet, where it is replaced by the red fir, *Abies magnifica*. At certain places it is rarely found above 7500 feet.

At its lower limit it is found only in protected gulches along streams, but with an increase in elevation and atmospheric

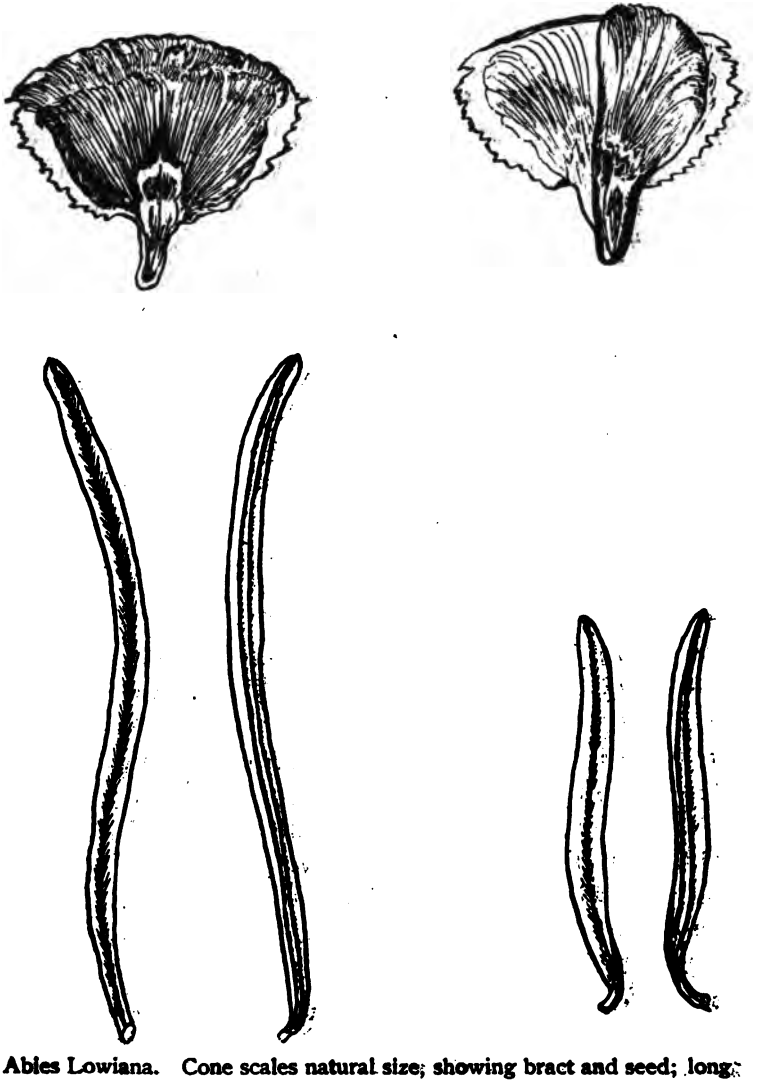
moisture, comes out of the ravines upon north or east slopes. It is rarely found on south slopes, even near its upper limit. It is less common in Nevada on the north side of the Truckee river than in the region south of that stream, the slope exposure not being so well suited to its growth.

The southern limit of the species in Nevada is probably in Douglas county southeast of Lake Tahoe, but it may occur in the mountains west and southwest of Walker lake in Mineral county. I have never explored that region, but as seen from the railroad, it presents a considerable forest growth. In California it is common on the east side of the Sierra Nevada between Truckee and Summit along the railroad. At elevations

Figure 26. Fruiting branch of Abies Lowiana

between 6500 and 7000 feet it is practically the only tree on the north slope which the railroad traverses, although the opposite or south slope across Donner lake is clothed with young Jeffrey pine. About Summit station, at 7000 feet, it is less common, red fir largely taking its place.

Plate 15



Abies Lowiana. Cone scales natural size; showing bract and seed; long lower and short upper leaves, twice natural size

As stated before, its range is from middle Oregon to Mt. San Pedro Martir in northern Lower California. In the Coast Range of California, according to Jepson, it is found as far south only as Snow mountain in Lake county. South of that point it is absent in the coast region for a distance of 360 miles, appearing again on Mt. Pinos at the west end of the Tehachapi range. This range connects the two mountain systems in the south, furnishing an easy path for the species to follow from the Sierra Nevada. In Oregon it is found as low as 2000 feet; in northern California at 3000 feet and under along Mad river; at 1300 feet on the Feather river near Bidwell Bar on the west slope of the Sierra Nevada; in southern California as low as 4000 feet.

While the wood is much inferior to that of either the white or the yellow pines, being light and not strong, and on account of its lack of resin having a rather low fuel value, it is used rather extensively. Like all other inferior woods, it will come more into use as the better ones become scarce. Quite a bit of it is found in the cordwood used in Reno, and during the past year a good percentage of the "mill blocks" (small ends of boards and knotty and defective parts from the planing mills) consisted of white fir.

Some of it is is made into lumber for general construction purposes, and since it is easily worked and free from resin, should be fairly useful in many ways. Being inodorous it is much used for butter boxes and other food and fruit containers.

The pulp and paper mill at Floriston, California, on the east side of the Sierra Nevada, uses white fir wood almost exclusively, consuming about seventy-five cords a day. Both the mechanical and chemical (sulphite) processes are used. This tree will no doubt become one of the chief pulp wood producers of the Pacific coast.

Reproduction is good, the seeds germinating either in litter and humus as well as in mineral soil, provided there is considerable soil moisture. It is a tolerant tree, and even when suppressed for a long period will develop rapidly when admitted to the light.

The fact that it is more exacting in moisture requirements and more tolerant than either of the yellow pines or the sugar pine, with which it is associated in California and Nevada, give it a prominent place in forestry problems, both from the lumber standpoint and from that of conservation of moisture.

On south or west exposures the pines have no difficulty in holding their own, but on north slopes especially, the fir is rapidly gaining the ascendency. The slope along the railroad between Truckee and Summit, California, already mentioned, is a good example. Except on the lower parts of this slope, there are no pines visible from the railroad. No doubt pines were plentiful at one time, but they were cut down, and the tolerant firs immediately began to take possession, crowding out and killing the pine seedlings that may have come up.

This process is going on over hundreds of north slopes, and from the lumber standpoint is to be deplored. But looked at from the moisture conservation angle it is a blessing in disguise. For middle and southern California and all of western Nevada, the conservation of moisture on the higher mountains is vastly more important than the continuance of forest that will produce lumber of the highest grade. The pines are cut, usually with no reference to reproduction, the result being bare and exposed slopes from which the rain rapidly drains off and snow quickly melts. But unless there is a local demand for pulp wood and packing box material, the white fir is cut only for log chutes and such rough construction as may be necessary about the lumber camp.

Snow is the main factor in our water supply. Young firs are covered with branches from the ground up. They give an abundance of shade, but the branches are pliable enough to permit the snow to reach the ground with but little loss. It follows that in this tree we have a forest cover which prevents rapid melting and evaporation, and we have this cover best developed on north slopes, the place where it will do the most good. The growth of fir should be encouraged in every possible way in regions where the water supply depends upon the conservation of snow.

A SMALL FLOWERED MIMULUS

By A. A. Heller

Mimulus micranthus sp. nov.

Plant flaccid and weak, stems 5 or 6dm. high, often rooting at the lower nodes, quadrangular, slightly winged angled above, about 4 mm. thick, glabrous and slightly glaucescent, sparingly leafy, the lower internodes 1 dm. or more long: lower petioles 3 cm. long, 1.5 mm. wide, slightly winged, blade more or less cordate-orbicular, 2.5 cm. across, thin, dull green, glabrous, irregularly and coarsely crenate, a few small lyrate divisions at the base; uppermost leaves reduced, acting as bracts, sessile and connate,, bearded with chaffy white hairs: flowers mostly terminal, but a few scattered near the middle of the stem: pedicels very slender, the lowermost 2cm. long, the upper less than 1cm.: calyx 8 mm. long after anthesis, slightly puberulent, purple mottled, only one of the purple edged acute lobes noticeably larger than the others: lemon yellow corollas 1 cm. long, the tube 8 mm. long, cylindrical, about 1.5 mm. in diameter up to a point 2.5 mm. from the base, where it is slightly constricted, then widening and inflated but somewhat flattened laterally, 4 mm. wide, 2 mm. deep, the upper side slightly convex, the inside of the tube at this point with two channels and two conspicuous lines of yellow hairs on the lower side, the upper with two inconspicuous rows of hairs; throat nearly closed; lobes of the corolla 2mm. long, broad and rounded, the upper lip with a spread of 5 mm., its lobes curved upward, lower lip 8 mm. wide, its lobes spreading or slightly downcurved, the middle one with one or two minute red dots at the base: pods 4 mm. long tipped with the 2 mm. long style with pubescent stigma lobes: the small seeds ovoid, pale cinnamon red.

The type, my *7410*, has been lying in my herbarium under the above name since 1904, when it was collected May 13th two or three miles west of Congress Springs, Santa Clara county, California, by a roadside ditch under a wet and dripping bank. I also collected it on the hills west of Los Gatos, April 30, 1908, no. *8936*. Fragments of it have also been brought in from Los Gatos canyon. So far I know it only as from the above mentioned places, the total range not over ten miles. While ascending, the stems are very weak. It seems to have no near relatives in the group of *M. Langsdorfii*, to which it belongs.

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ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 164 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 164 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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Volume 8 Number 12

MUHLENBERGIA

DECEMBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Coreopsis gigantea (Kellogg) Hall

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University of Nevada,
Reno, Nevada

Volume 8 January 31, 1913

MUHLENBERGIA

COREOPSIS GIGANTEA (Kellogg) Hall

By S. B. Parish

The islands which lie off the coast of southern and Lower California possess a flora full of interest to the student of the origin and distribution of plant populations, so many are the plants, anomalous in their characters and limited in their dispersion, which are included in it. So unrelated are some of them to the general vegetation of the mainland, that they seem the relics of a remote past, here and there preserved in the midst of comparatively recent successors. That they are less adapted to present conditions than are the newcomers is evident from the fact that most of them are failing in the struggle for existence, and gradually perishing before our eyes. Some are confined to the islands, and even to a particular one of them, while others have a limited foothold on the adjacent continental shores, but in no case beyond the immediate influence of the sea.

Among these last is the curious composite here illustrated. It occurs on at least six of the islands, from Santa Cruz to Guadalupe, and is also found at some scattered stations along the coast from San Luis Obispo to Point Dusne in Los Angeles county. While it is thus one of the most widely distributed members of the peculiar insular flora, it is nowhere abundant. Probably it owes this rarity, in some degree, to the fondness of animals for its foliage. According to Lyon (Bot. Gaz. **11**: 205) even men relish its leaves as "greens."

It was first described by Kellogg, in 1873, in the Proceedings of the California Academy (**4**: 198) as *Leptosyne gigantea*, but the genus to which he referred it having recently been united with *Coreopsis*, Hall accepted the reduction, and, in his

Figure 27. Coreopsis gigantea (Kellogg) Hall

Compositae of Southern California, transferred the species to the latter genus. The photograph from which the illustration was made, was taken at Hueneme, Ventura county, in March, 1894, by Mr. W. G. Wright.

San Bernardino, California.

ADDITIONS TO THE FLORA OF THE BLACK HILLS OF SOUTH DAKOTA—II

By Stephen Sargent Visher

In Torreya for September, 1909, pages 186-188 appeared a first list of additions. In this some eight species were added to the flora of the state and some eight additions new to the Hills, though known from the eastern part of the state.

June 30, 1911, Harney Peak was visited and a small number of plants collected. These were determined by Professor Aven Nelson. Six additions to the published flora of the state can be made as a result.

July 22-27, 1912, in connection with other state survey work in the northern part of the Black Hills, in localities not visited in 1908, certain interesting plants were collected. These were determined by Dr. P. A. Rydberg. Thirteen proved to be additions to the flora of South Dakota, and three others are new to the Black Hills, though known from the eastern part of the state. Three others recorded by Rydberg, Cont. U. S. Nat. Herb. **3**: 463-536. *pl. 17-20.* 1896, in his list of the plants of the Black Hills, but not included in Saunders Catalog in Bulletin 64, South Dakota Experiment Station, 1899, are mentioned.

In the following list the nineteen additions to the state flora are printed in italic; those known also from the eastern part of the state are followed by (eastern). I am grateful to Dr. Rydberg for editing this list for me.

Agrostis hyemalis (Walt.) B. S. P.

Abundant on wet ground, especially at high altitudes. Collected near Nema (eastern). Collected near Custer by Rydberg but omitted by Saunders.

Alopecurus aristulatus Michx.

Fairly frequent on wet grounds along the Boxelder canyon. Though recorded by Rydberg under the name of *A. geniculatus* this species is recorded only from eastern South Dakota by Saunders.

Bromus Pumpellianus Scribn.

Tolerably common on Harney Peak. Though recorded by Rydberg this species is entirely omitted by Saunders.

Koeleria gracilis

Common in the Red valley near Rapid City; rare higher.

Phleum alpinum L.

Abundant in meadows on Harney Peak.

Poa Wheeleri Vasey?

Common on Harney Peak.

Tradescantia occidentalis (Britton) Smyth

Common in wet meadows at low elevations near Rapid City; frequent near Hot Springs (determined by Nelson).

Juncus confusus Coville

Frequent along streams near Este.

Juncus Dudleyi Wiegand

Abundant on streams throughout.

Lilium montanum A. Nelson

Conspicuous in open woods about Harney Peak.

Sisyrinchium mucronatum Michx.

Abundant in grass land in the parks, etc., near Custer Peak.

Aconitum porrectum Rydb.

Common in woods above 5000 feet near Nasby, etc.

ANEMONE VIRGINIANA L.

Frequent along roads and in openings (eastern).

Aquilegia violacea (Nutt.) Rydb.

Occasional in shady woods along Boxelder canyon.

Ranunculus micranthus Nutt.

Rare along the Boxelder canyon.

Thalictrum dasycarpum F. & L.

Plentiful along the valleys.

Arabis luteola Greene

Rare on rocks, Harney Peak.

Erysimum elatum (Nutt.) Rydb.

Tolerably common along the valleys near Nasby.

HEUCHERA PARVIFOLIA Nutt.

Common on shaded cliffs about Harney Peak. Hitherto only recorded from near Rochford.

Drymocallis pseudorupestris Rydb.

In meadows on Harney Peak; not common.

Physocarpus pubescens (Rydb.) A. Nelson

Common on talus slopes of Harney Peak.

Trifolium hybridum L.

Exceedingly abundant along all roads of the northern Hills above 5000 feet elevation.

ANTENNARIA PARVIFOLIA Nutt.

Common on rocks near the top of Harney Peak (one eastern locality). Rydberg recorded *A dioica parvifolia* (*A. parvifolia*) but it was omitted by Saunders.

Arnica Rydbergii Greene

Frequent in alpine meadows on Harney Peak.

LACINIARIA LIGULISTYLIS A. Nelson. Blazing star.

Numerous in prairies on burned areas above 5000 feet; included by Rydberg in 1894 under *L. scariosa*.

LACTUCA CANADENSIS L. Fall lettuce.

Along Boxelder canyon, elevation 4000 feet; frequent (eastern).

SOLIDAGO GLABERRIMA Martens

Abundant in Red valley near Rapid City; included in Rydberg's report with *S. missouriensis*.

Tetraneuris simplex A. Nelson

Plentiful on rocks and bare ground of the Red valley.

University of South Dakota, Vermillion, South Dakota.

NEW WESTERN PLANTS

BY A. A. HELLER

Caulanthus senilis sp. nov.

Apparently biennial, the simple stem 3 to 3.5 dm. high including the inflorescence, fistulous, 5 to 8 mm. in diameter below the inflorescence, glabrous, glaucous and purple tinged: leaves glabrous, chiefly basal, lanceolate, elliptical-lanceolate or broadly oblanceolate, irregularly and coarsely sinuate-dentate,

Plate 16

Caulanthus senilis Heller

acute, short acumiuate, or the lowermost rather blunt, 5 to 8cm. long, the blade tapering into the long petiole which about equals the blade: stem leaves reduced to linear bracts 3 or 4 cm. long, 2 mm. or less wide: inflorescence about 14 cm. long, rather loosely flowered: flowers large, 15 mm. long, about 6 mm. in diameter, subsessile: calyx pale violet, clothed with soft white chaffy hairs, the lobes oblong, obtuse, 12 mm. long, 3mm. wide, concave or low canoe-shaped, the concavity 1 mm. deep: petals 16mm. long, 3mm. wide at the middle, a little narrower at both base and apex, the part included in the calyx with a broad green band up the middle marked with three veins, the margins hyaline; the exserted portion 4mm. long, spreading, purple, hyaline margined: filaments awl-shaped, 6mm. long, 1mm. wide at base, .5 mm. at apex; anthers oblong, slightly auriculate at base, the auricles rounded, 5 mm. long, 1 mm. wide throughout, inserted on the filament 1 mm above the base: style 5 mm. long, 1 mm. in diameter; stigma lobes 2, about .5 mm. long, blunt: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10506*, collected June 25, 1912, at an elevation of 7500 feet, on the lower slopes of the White mountains, Mineral county, Nevada. A few plants only were found on a dry, stony, northeasterly exposure under and near scattered juniper and nut pine trees

This species is a near relative of *C. crassicaulis*, the type of the genus, and by some may not be considered distinct. It differs, however, if the description and illustration in Stansbury's Report 383 *pl. 1.* can be relied upon, in the sinuate-dentate instead of lyrate leaves with much enlarged terminal segment; calyx lobes of equal width throughout instead of tapering to the apex; petals of a more uniform width and not notched at the apex; anthers of uniform width instead of tapering, and less strongly versatile. It seems to normally be a much smaller plant. Geographically it should be distinct, since comparatively few species from the eastern borders of the Great Basin are found on its western rim.

Cressa vallicola sp. nov.

Diffusely erect-spreading, 2 dm. high or less, branched from the base, the branches numerous, slender, woolly-villous, as is the whole plant, even to the outside of the corolla lobes, leafy throughout: leaves elliptical, the largest 1cm. long, 4mm. wide those of the inflorescence but little reduced: inflorescence usually occupying the upper half of the branches, frequently appearing as if secund: pedicels 4 or 5 mm. long: calyx bibracteolate, the bracts foliaceous, shaped like the leaves, 3 to 3.5 mm. long: calyx 5mm. long, the lobes elliptical-obovate, 2mm. wide, blunt and rounded at the apex, strongly concave, harsh and coriaceous in texture, the inner ones but little narrower than the outer: corolla white, 6 mm. long, the tube 3 mm. long; lobes lanceolate, acutish, slightly over 1 mm. wide; overlapping a little, bearded externally: stamens equaling or a trifle shorter than the corolla, the filaments subulate; anthers 1mm. long, scarcely narrowed at apex, auricled as base, the auricles blunt: pistil equaling the corolla, style 2 parted for two-thirds its length, the united lower third woolly; stigmas capitate: ovary densely lanate, a tuft of long hairs extending up to and concealing the style to the point of division.

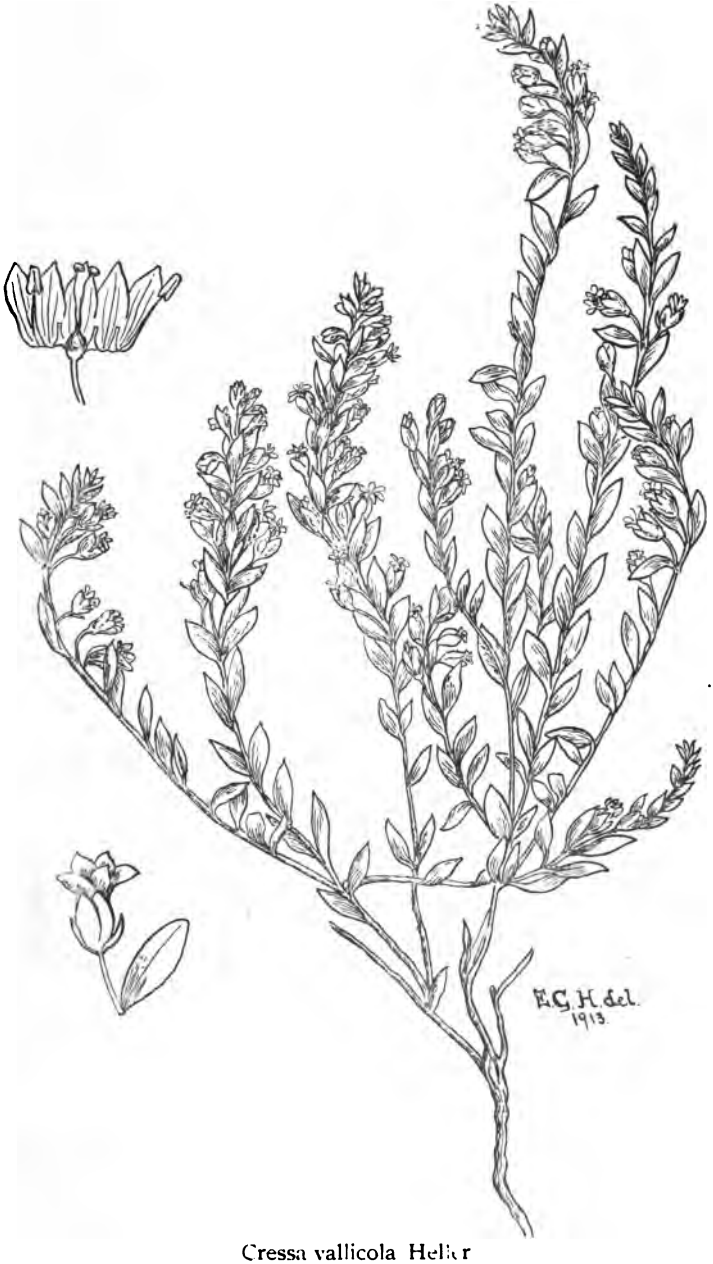
The type, in the herbarium of A. A. Heller, is *Heller 8936a*, collected June 4, 1908, a short distance east of San Jose, Santa Clara county, California, in a depression along the roadside, wet in early spring, but at that time covered with the Cressa plants.

This is no doubt the *Cressa cretica* of Jepson's Flora of Western Middle Caiifornia, which is said to be "especially common in the San Joaquin Valley, often covering thousands of acres." While not at present having access to specimens of true *C. cretica*, I did study it some years ago. and am convinced that it does not occur in this country.

Cressa minima sp. nov.

Prostrate and creeping, silky sericeous throughout, the stems 3 to 7 cm. long, floriferous for half their length or more, leafy throughout: leaves elliptical-oblong, the largest 8 mm. long, 3.5 mm, wide, subsessile: pedicels short, 1 to 2 mm. long: bracts

Plate 17



Cressa vallicola Heller

foliaceous, broadly elliptical, 2 mm. long, 1 mm. wide, rounded at apex, inserted .5 mm. *below* the calyx: calyx 5 mm. long, the lobes obtuse, broadly elliptical, 2.5 mm. wide, concave, about equal: corolla white, the tube 4 mm. long; lobes broadly ovate, 2 mm. long, 3 mm. wide when fully spread out, the apex blunt and rounded, strongly plaited and overlapping at the sinus: stamens not extending beyond the corolla tube, subulate, only the upper half free, the united portion bearded; anthers 1mm. long, the base slightly auricled, the auricles rounded and the sinus almost closed: styles 2, distinct, glabrous, a little shorter than the stamens; stigmas capitate: upper half of the ovary densely woolly.

The type, in the herbarium of A. A. Heller, is *Heller and Kennedy 8663a*, collected July 1, 1907, at Hine's ranch, north side of Peavine mountain, Washoe county, Nevada, elevation about 5000 feet, growing in a low damp place in a field.

It was distributed as *Cressa depressa* Goodding, but is smaller than that species, the pubescence much more appressed and silky, and the flowers totally different, as may be seen in the accompanying figure.

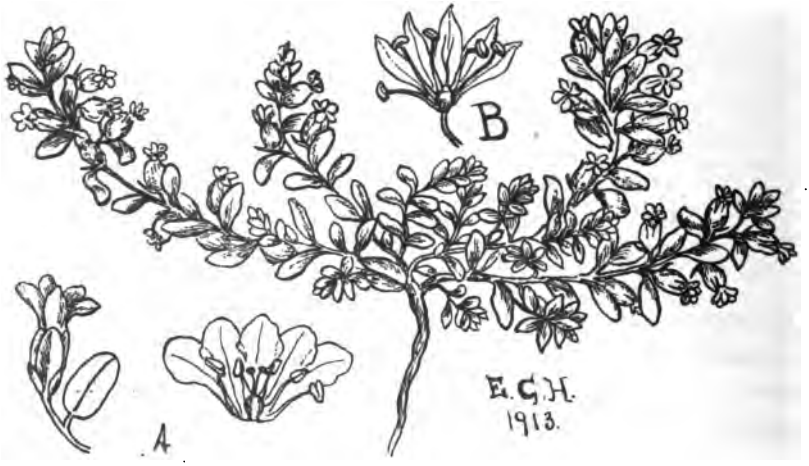


Figure 28. - Cressa pumila. B. Enlarged flower of C. depressa Goodding, from the type collection.

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